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Mechanics of Paint Manufacture

DEVELOPMENTS in manufacturing processes directed towards the production of an improved article can take place either in what might be termed the "materials" side of the process, that is to say, in the quality of the new materials employed, the incorporation of certain ingredients to give desired effects, and the like, or in the mechanical side which is concerned with the construction of plant and apparatus for carrying out the process, the modification of the physical conditions of the process, and the application of machinery for changing the physical nature of the processed material by mechanical stress. In most industries progress is continually being made in both of these two branches of manufacture, but there are several in which the introduction of improvements is more or less restricted to one of the two sides only. A good example of this is furnished by the paint trade. Paint products of one kind or another have been made almost from time immemorial, and from the very earliest times the fundamentals of the mechanical side of the actual process of manufacture have remained practically unaltered.

Briefly, the mechanical side consists essentially of two separate operations. First, grinding the powdered pigment in an oil medium to the consistency of a semi-paste and then diluting the semi-paste down with further oil. In the manufacture of printing ink, the material is not taken beyond the semi-paste stage. Advances in the production of paints and printing inks have for the most part occurred in the "materials" side. New pigments, oils, driers and gums have been discovered and the properties of the paints obtained have been investigated, together with the determination of the most advantageous proportion in which each constituent should be present.

On the mechanical side, the object of early efforts was the design of suitable machines for smashing down the particles of pigment to as small a size as possible by mechanical force. Obviously, it was thought, the larger the mechanical force the better. A mill was constructed having a huge granite roll running in a flat bed containing the powdered pigment and oils; this mill exists to-day in the edge-runner. Later, mills consisting of a large number of heavy metal rolls running in contact were introduced. Roller mills were found to have the advantage that the force applied to the pigment particle was not only that due to the weight of the roll only, but a strong shearing action was exerted also.

Roller mills of these two broad types were used for many years, excellent paints being produced. As satisfactory results were obtained with the machines, very little consideration was given to the change which grinding brought about in the pigment, it being

generally assumed that reduction in particle size was the sole operation performed, and the smaller the particle size the higher the quality of the product. It was only much later that it was realised that the effect of grinding with these heavy mills was not so much to smash the pigment into small particles as to ensure that each pigment particle was uniformly coated with a film of oil medium, and it was the successful performance of this latter function which determined to a large degree the final quality of the paint or printing ink produced. This conception materially altered the mechanical side of manufacture. For general purposes, mills could therefore be of lighter construction and the number of rolls reduced. The tendency was towards mills which had more of a smearing than a grinding action on the powdered pigment and oil.

Recent years have seen increasing attention paid to the condition of the pigment in the oil medium after it has passed through the mill and to the forces which maintain it in that condition. In a paper to the Oil and Colour Chemists' Association, Mr. R. F. Bowles set out to clear up the mass of terms which has been ascribed to the various phenomena associated with particles in non-aqueous media. There has been some doubt in the past what precisely is inferred by the terms "wetting" and "dispersion." Mr. Bowles postulated that true wetting was associated with a powerful bond between the particle surface and the liquid, amounting in most cases to chemical reaction, or at least to the interaction of very strong secondary valence forces. Thus the wetting of glass by petroleum ether could not be claimed to be true wetting. The use of the term dispersion was restricted to the mechanical dispersion of particles in a non-wetting medium. In printing inks, thixotropic effects are manifested and it has been stated that there is a connection between the development of thixotropic structure and incomplete wetting. Mr. Bowles pointed out that blown oils and fatty acids, both known to be good wetting agents, increased the rigidity of a carbon dispersion, thus refuting the statement that thixotropy is concomitant with lack of wetting.

In summarising the position, he said that, although mechanical dispersion was necessary for the preparation of a uniform pigment-vehicle continuum, wetting was not necessarily required. He suggested the electro-mechanical theory of thixotropy, which does not introduce wetting, as explaining all the facts. The pigment-vehicle relationship is the essential foundation of paint, for it is clear that the success of the paint manufacturer largely depends on determining which pigment behaves in the best way with which vehicle.

Notes and Comments

Expansion in Anglo-Argentine Trade

FIGURES for Anglo-Argentine trade during 1937 show very substantial all-round increases. (The principal British exports to this market have risen in value to 19½ million pounds approximately, a gain of nearly 31 per cent. over 1936. A trade agreement between the two countries was established in 1932, and it is significant that since that date the increase in our exports to Argentina has been 83 per cent.; a striking testimony to the beneficial effects obtained by international trade pacts. British exports of chemicals, drugs, dyes and colours have risen side by side with the general improvement, an increase of 29 per cent. in value over the previous year being registered. Imports from Argentina during the last year have risen in value to £59,473,000, an increase of 32.8 per cent. over 1936. Although the British share of the Argentine market remains greater than that of any other country, our percentage of total Argentine imports fell slightly in 1937. On the other hand, the demand for British goods has been cumulative as Argentine purchasing power has steadily increased following the record exports. Thus, at the end of the first six months of 1937, the rise in British exports was only 19 per cent., at the end of nine months 26 per cent., and over the whole year 30.7 per cent.

Chemistry in Medicine

ALTHOUGH the chemist has made contributions to medicine in the past, it was not perhaps until the discovery of the unique disinfecting properties, coupled with very low toxicity, of the Prontosils and allied compounds completely changing the treatment of certain cases of bacterial infection, that it was realised what results could be obtained by the collaborative work of the chemist and physician. (The announcement of the Prime Minister, at Monday's annual meeting of the London School of Hygiene and Tropical Medicine, may well mark a real advance in preventive medicine through this kind of collaboration. He stated that Imperial Chemical Industries, Ltd., have undertaken to provide £2,000 a year, for four years, towards the fund established in aid of the School's research into chemical immunity. The object of this research is to isolate from organisms which cause such diseases as whooping cough, typhoid, cholera, and puerperal fever, chemical constituents which can be injected into living persons and give them immunity. An object of the co-operation of the School and I.C.I. is to carry over the results of the research from the laboratory to the stage of large-scale manufacture and practical application.

A World Survey of Industrial Research

WHEN thinking broadly of technical achievements in the past, some subjects would be immediately associated in the mind with particular countries. One would connect Germany with dyestuffs, Switzerland with pharmaceuticals, and so on. In many cases the reason for this geographical cornering of industrial research could be put down to the presence of indigenous raw materials and abundant natural power (for instance, Norway with the fixation of atmospheric nitrogen in Nordhausen acid), but in others there seemed to be no particular reason. To-day problems are tackled on a much broader front. According to Dr. W. A. Hamor, assistant director of the Mellon Institute of Industrial Research, in a world survey of research activities during 1937 reported to the Ameri-

can Chemical Society, research in America appears to be very wide in scope. Recent achievements include the production of vitamin A from fish-liver oils by molecular distillation, the electrolytic reduction of sugars to corresponding alcohols on an industrial scale, and the manufacture of synthetic ascorbic acid, new adhesives from synthetic resins, cellulose sponges, plastic wood, electrolytically coloured metals, new pigment dyestuffs, new wetting and emulsifying agents, and new plasticisers. In Italy much work has been done during the past year in explosives, coal hydrogenation, and heavy chemicals, improvements being made in the production of barium sulphate and titanium dioxide. Industrial research in France related mainly to dyestuffs, heavy chemicals, naval stores, essential oils, perfumery and toilet preparations, and fertilisers, while in Germany, plastics, rubber, textiles, fats, cellulose, and metals received the greatest attention. (The survey covered most of the countries of the world and, even in the small countries, research during the past year covered as wide a field of subjects as in the instances given above.

Work of the Indian Lac Cess Committee

THE report of the Indian Lac Cess Committee for the year ended March 31, which has just come to hand, demonstrates the volume of work being done on the fundamental chemistry of lac and on methods of refining and treating lac to increase its utilisation in industry. In addition to lac research in India, it is also undertaken in the United Kingdom, through the London Shellac Research Bureau, and in America (the New York Shellac Research Bureau) under the auspices of the committee. We have already referred to the work of the London bureau during the year and the diversity of problems investigated. The same variety in activities is shown by the work in India and America. Among the investigations conducted by the Indian Lac Research Institute were a study of lac bleaching, seedlac refining, solvent extraction of lac, modification of lac by acids, isolation of pure resin after the cold-hardening of shellac by urea; to give only a few examples. An outstanding research in America was the separation of the parent acids of shellac into several groups by solvent extraction. An important feature of the work is the modification of lac to form products which have, at present, no direct counterpart in synthetic resins.

The Import Trade of India

AN appreciable increase in India's imports is shown by a survey of the country's import trade for the six months ended September 30, 1937, published by H.M. Stationery Office. During the period, the value of the imports of merchandise increased as compared with the corresponding period of 1936 by 43 per cent. Although the share of the United Kingdom increased substantially in value, it declined in percentage of the total import trade. Chemicals and chemical preparations showed a welcome expansion from Rs.117.8 lakhs to Rs.154.5 lakhs, the principal categories registering increases being acids, bleaching powder, disinfectants, potassium chlorate, sodium carbonate, caustic soda, zinc compounds, and sulphur. (There was an important advance in drugs and medicines from Rs.86.1 lakhs to Rs.105.2 lakhs and there was also a sharp advance of over 50 per cent. in the total import trade of coal tar dyes. This increase was mainly obtained by Germany, but shipments from the United Kingdom also increased from Rs.15.7 lakhs to Rs.16.3 lakhs.

Materials Used in Modern Bleaching and Finishing

By

G. S. RANSHAW

THE older methods of dealing with the colouring matters and other undesirable substances associated with natural textile materials in the raw state relied to a large extent on materials and processes which endangered the integrity of the fibre. Increasing knowledge of the constitution of both cellulosic and protein fibres, however, has brought about a change in technique and the development of milder, but quite as efficient reagents. It is the purpose of this article to review briefly the materials entering into the bleaching and finishing technique of to-day.

De-sizing Cotton Fabrics

A necessary preliminary operation to bleaching cotton fabrics is always that of de-sizing, the object of which is to remove the protective sheath of size with which the warp threads are furnished, in order to facilitate weaving. This size is generally made on a starch basis, and its elimination is accomplished by conversion to "soluble starch," dextrine or glucose. The materials used are the mineral acids, the diastases, dilute alkalis, the Activins and Chloramines, or the per-salts.

The use of mineral acids follows the classical method for the conversion of starch to glucose. The fabric is treated in a bath containing 2-3 gr. sulphuric acid per litre at 50° or 60° C., left overnight for preference, and then washed in running water; alternatively the fabric may be treated in a bath of dilute hydrochloric acid (3 gr. per litre) for half an hour at 50° to 60° C., after which it is rinsed and neutralised in an alkaline medium. This method, still largely used, has been modified in accordance with the trend mentioned in the introductory paragraph, in that softening agents have been devised to eliminate the harsh feel which the treatment is liable to confer on the goods.

The chemistry of the enzymes has been fruitfully exploited, however, in the effort to devise a method of breaking down the starch without harmful effect on the cellulose. Enzyme preparations of both a diastasic and pancreatic origin are marketed which are harmless and rapid in action, some indeed being specially adaptable to continuous operation (Rapidase). Certain of these preparations are accompanied by calcium chloride or sodium chloride, whilst in the case of the diastasic preparations the addition of a softening agent on a sulphonated oil, sulphonated higher fatty alcohol, pyridine or cresol basis is useful to prevent brittleness.

The use of alkalis for removing starch sizes is restricted principally to heavy goods. These are impregnated with a boiling solution of caustic soda made up as follows: 12 litres of 40° Bé NaOH per 1,000 kg. of cotton. Treatment lasts 24 hours, after which the goods may be washed. It is customary in some quarters to use the spent lye from the mercerising range for the purpose.

Finally, mention may be made of a type of agent successfully developed, which is capable of de-sizing and bleaching simultaneously. These agents go under various proprietary names (Chloramine T, Pyrgos, Aktivin, etc.). Chloramine T, for instance, is sodium-p-toluene-sulpho-chloramide, $C_6H_4(CH_3)(SO_2.NCl.Na)3H_2O$. 2-2.5 kg. of these agents is used along with 2-2.5 kg. sodium carbonate per 1,000 kg. of goods, the operation being conducted at 80° to 90° C.

The Kier Boil

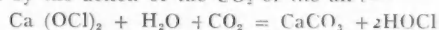
Again a preliminary operation to the bleach proper, the kier boil has the purpose of freeing the cotton fibres, which consist of pure cellulose, from the foreign materials associated with them in the raw state; oils are saponified, waxes are emulsified, proteins, pectoses and pectins are hydrolysed and rendered soluble. Lime, caustic soda and carbonate of soda are employed, a standard liquor consisting of caustic

soda (3° to 4° Bé), a resin soap, bisulphite, softening agents and special assistants. In this liquor the goods are boiled for 8-10 hours under pressure and in absence of air. The sulphite or bisulphite of soda is employed as an anti-oxidant in order to avoid oxycellulose formation. Trisodium phosphate has found an extended use of late, whilst the Marseilles and resin soaps formerly employed are being replaced by special softening and protective agents—highly sulphonated oils, fatty alcohols (sulphonates) and products based on alkyl-naphthalene derivatives. The process of kier boiling not only purifies the fibre but renders it hydrophilic and therefore more amenable to bleaching proper.

Cotton Bleaching Methods

Cotton is bleached exclusively with oxidising agents, amongst those used being chloride of lime, sodium hypochlorite, hydrogen peroxide, ozone, liquid chlorine and permanganate of potash. Not all these methods are of equal utility or even widely practised.

The chlorine bleach is standard practice in the cotton trade to a large extent, although the disadvantages of calcium deposits on the fibres, the danger of oxycellulose formation, and the multiplication of processes brought about by the necessity for acidification subsequent to chlorine treatment have caused other methods to be exploited. The action of the bleach is relatively simple, hypochlorous acid being evolved by the action of the CO_2 of the air:—



or,



In contact with the fibre the HOCl decomposes,



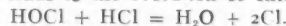
the nascent oxygen functioning as bleaching agent. An active chlorine content of the liquor of about 2 to 4 gr. per litre is sufficient and the use of softening and protecting agents is recommended.

The use of chlorozone may be mentioned. This is a bleaching liquor prepared by passing chlorine into caustic soda, but to the author's knowledge its use has never been popular in this country.

After the bleach the fabric is rinsed with cold water and then in a dilute acid solution. The use of a mineral acid here acts as an anti-chlor and assists the decolourising action:



Excess of acid leads to the evolution of chlorine:



Hydrochloric acid is generally used because it is able to dissolve any lime present in excess and liable to form a deposit on the fibres; sulphuric acid is liable to leave deposits of calcium sulphate on the fibre, which is insoluble and which would have a deleterious effect on the dyeing.

Hydrogen Peroxide Bleach

The bleaching action of hydrogen peroxide is milder than that of chlorine, and, if properly controlled, is able to give satisfactory results, especially where subsequent dyeing will be in darker shades which do not require a pure white. The baths are made up with 1-2 volumes of H_2O_2 plus silicate of soda to stabilise the peroxide. The use of a sulphonated higher fatty alcohol is recommended, and bleaching agents which incorporate the peroxide, the alcohol and a stabiliser are giving very good results. These baths are worked on the alkaline side (pH 10-12) and varying temperatures are used.

Where the goods contained coloured cottons not dyed with vat dyes, the use of a bleach liquor on a basis of sodium peroxide or sodium perborate has been found useful. Thus, 1 kg. of sodium peroxide per 100 gallons of water is slightly

acidulated with 1.5 kg. sulphuric acid (60° Bé). Silicate of soda is added till slightly alkaline and the goods are immersed for several hours, the temperature being kept at from 40° to 50° C. The potassium permanganate bleach is not much used on account of its complexity and cost. In principle, the goods are treated in a bath containing potassium permanganate and sulphuric acid, then in a bath of sodium bisulphide and sulphuric acid. The manganese dioxide so formed is reduced by the bisulphide, and the fibres bleached in the process.

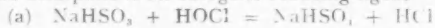
Two Modern Bleaching Processes

Two modern processes for bleaching cotton on which considerable work has been done may now be mentioned. The first, described in B.P. 280,488, uses *chlorites* in place of hypochlorites. These specially prepared, very unstable compounds, do not attack cellulose even at high temperature and in presence of acids. The chlorites of barium, calcium, potassium, sodium, have been used to bleach at 100° C and pH 3.5 without attacking the fibres.

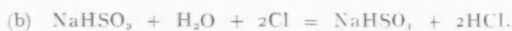
A "cold" bleaching process, on the other hand, is represented by Fr. P. 743,926 (S.C.I., Basle) and consists of submitting the goods first to an oxidising bleach, then to an alkaline treatment, and then to a second oxidising bleach. 100 kg. of raw cotton goods (de-sized) is submitted to a chlorine bleach for 2 hours at ordinary temperature in a bath containing sodium hypochlorite (4 gr. active chlorine per litre) and softening agents (sulphonated oils, etc.). After rinsing, the goods are treated for 3 hours at 80° C. in a 1 per cent. solution of caustic soda and Marseilles soap. Thereafter they are saturated to a second bleach with hypochlorite (1 g. active chlorine per litre).

Before leaving the subject of the cotton bleach some attention should be given to a most important class of substances—the antichlors which literally *remove* chlorine from materials. The principal ones in use are hydrochloric acid and sulphuric acid; sodium bisulphite and hydrosulphite; ammonia; hydrogen and sodium peroxides; perborate of soda. The action of the acids has been mentioned: they cause the evolution of hypochlorous acid (HOCl), but if in excess chlorine alone is evolved.

Sodium bisulphite is an energetic reducing agent

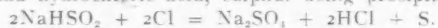


or,

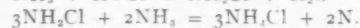


Thus we get the bisulphate of soda and hydrochloric acid, so that a good rinse to remove the HCl leaves the fabric in a safe condition.

Sodium hydrosulphite is also an energetic reducing agent, acting by combining with free chlorine to give sodium sulphate and hydrochloric acid, sulphur being precipitated.

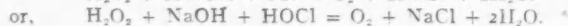


Ammonia is an excellent antichlor. It combines with free chlorine and hypochlorous acid to form chloramine, an unstable product which decomposes with excess of ammonia.



Slight excess of ammonia transforms the chloramine into ammonium chloride, which is neutral. There is no need to rinse the goods.

The best antichlor is hydrogen peroxide, its action being rapid and complete. It is used in a warm, alkaline medium. The H_2O_2 , being made slightly alkaline by the use of caustic soda, produces the evolution of nascent oxygen which has a bleaching action, eliminating the chlorine in the form of sodium chloride



Bleaching Synthetic Textiles

Here again a process of size-removal preliminary to bleaching is essential, but there is this difference, that the size nowadays used with viscose and acetate rayon is not com-

posed on a starch basis. The most commonly-used sizes for rayon are based on linseed oil, which is not difficult to remove provided it has not aged, when difficulties may be considerable. Oxidised or resinified linseed oil size needs very careful treatment, and the alkaline baths necessary can cause much damage to the sensitive rayon filaments.

The products ordinarily used for size removal are soaps plus soda or ammonia, sulphonated oils, sulphonated higher fatty alcohols, and these products in combination with organic solvents, in alkaline baths. The well-known products such as the Meliorans, Cyclorans, Gardinols, etc., may all be specially adapted to the purpose. With regard to acetate, of course, it is essential to avoid the use of soda, and a peroxide bath may be used to dissolve the linolein, after which a neutral soap bath may be employed.

The bleaching of viscose rayon is not always necessary, the product having been submitted to a bleaching treatment during manufacture. In special cases, however, a 0.5° Bé bleach liquor may be applied for a short period (15-20 minutes) after which the goods are washed and acidified with HCl (5-10 gr. per litre). Then follows a further rinse followed by an antichlor treatment with a solution of bisulphite in H_2O_2 . The use of free alkali should be avoided. Peroxide of soda may be employed in a neutral bath.

Special mention may here be made of a useful bleaching agent—Biancal—an organic sulpho-acid in which the molecule contains oxygen linked in a stable manner. This product evolves the oxygen very slowly and uniformly, even in an alkaline medium. After de-sizing the goods are simply treated in a bath containing 1 gr. per litre of Biancal for 1 to 2 hours at 60° C.

Raw Wool and Wool Fabrics

Just as foreign substances are associated with cotton in its raw state, so they are with raw wool, which must be freed from them before it can be bleached. Often, moreover, after this preliminary cleaning, the goods are woven before bleaching, in which case materials are added temporarily to facilitate spinning.

The materials associated with raw wool are of two kinds: (a) soluble materials, which can be removed by washing in pure water, and (b) greases (lanoline), which are removed by washing in baths composed of soap and sodium carbonate or ammonia. Vegetable constituents are removed by a process of carbonisation. As regards fabrics, these will be found to contain oleine and other oils added during the spinning process. Here removal is effected by use of soap solutions, although the danger of lime soap formation where water of any degree of hardness is used, has caused a movement towards the employment of the special assistants of a detergent nature—the Gardinols, Igepons, etc. Where soft water is available, soap plus sodium carbonate or ammonia is sufficient. Good quality oleine is removed by saponification with sodium carbonate alone. Olive and other vegetable oils require ammonia, mineral oils, being non-saponifiable, are emulsified. An I.C.I. product, Astol A, has been specially evolved for this purpose.

Bleaching Wool

In bleaching wool either oxidising or reducing agents are used. Of the latter and older agents, sulphurous anhydride, bisulphite of soda and the hydrosulphites have long been used. The modern tendency, however, is towards the use of the milder acting oxidisers, H_2O_2 , potassium permanganate or sodium peroxide. Of these the hydrogen peroxide and sodium peroxide processes offer better possibilities. In bleaching with hydrogen peroxide, for example, 100 kg. of well-scoured wool requires a bath made up of 1,500 to 2,000 litres of water containing 10 litres of 30 per cent. H_2O_2 . Goods are treated in this bath for 1 hour at 40° to 60° C., and then for 3 hours at about 80° C. Small quantities of ammonia are added in successive doses. Such a bath is adequately stabilised by 0.25 gr. per litre of a product such as Cycloran M.

The following process, due to Wm. Burton and Sons, for the use of sodium peroxide, may be of interest. For 50-70 kg. of wool the bath is made up of 450 litres of water, 3.75 kg. sodium peroxide, $1\frac{1}{2}$ kg. ammonium phosphate, and 4 kg. 66° Bé sulphuric acid. The bath should be neutral. The wool is entered at 25° to 30° C. and is heated slowly to 50° C. A standard peroxide bleach, on the other hand, is conducted as follows. The bath is made up of 450 litres of water plus 10 kg. H_2O_2 (100 vols.) and 50 kg. silicate of soda. This is maintained at 30° to 40° C. in wooden vats and the goods entered for several hours. Afterwards they are washed in water slightly acidulated with sulphuric acid, being subsequently rinsed in pure water.

Treatment of Silk

Corresponding to the de-sizing and kiering of cotton and the scouring of wool, the de-gumming of silk consists in freeing the fibroin from the sericin with which it is accompanied in its natural state. The normal treatment here is a soap treatment. Treatment in a hot, dilute soap solution frees the fibre from 5-6 per cent. of the gum, after which follows a treatment for 1-2 hours in a 10 per cent. soap solution at 25°-30° C. Now intervenes a treatment with a solution of cream of tartar (3-4 gr. per litre) at 100°, after which the goods are rinsed in lukewarm water. The fibre may now be freed from any lime soap which has been deposited, by entering into a warm, dilute hydrochloric acid bath, after which the final treatment takes the form of a 30-35 per cent. Marseilles soap solution at 90° to 95° C. In this bath, the gum or sericin which has been loosened in the preliminary treatment, comes away all together. (This bath, by the way, is utilised subsequently as the dye bath).

The bleaching of silk follows the lines adopted for wool bleaching, the principal agents being sulphurous anhydride, or hydrogen peroxide with added silicate of soda. Mention may be made, however, of the very useful agent, Blankit I, produced by the I.G. To utilise the excellent properties of the substance the degummed silk is introduced into a bath containing 0.5 to 1 kg. Blankit I to every 100 litres of water. It is left in this overnight at 60° to 70°, then rinsed. The Blankit I may be used, if preferred, with sodium peroxide.

Finishing Processes

Subsequent to any dyeing or printing operations undergone by a fabric there is a very large number of processes to which it may be submitted in order to secure some special effect depending on the ultimate purpose of the material. Some of these processes are mechanical, some purely chemical; some have simply the object of imparting an additional decorative effect to the cloth, others are directed to giving it some special physical quality or qualities. It is with the latter that we are concerned here, and it is only with the more important ones that we have space to deal.

The Waterproof Finish

The process of rendering a fabric waterproof has been practised for a long time, but recent efforts to improve various aspects of the resulting finish have introduced revolutionary conceptions which have lifted the process out of the rut. The ultimate aim of the proofing process is to render what is actually an absorbent, hydrophilic material, non-absorbent and hydrophobic.

This was previously accomplished by filling up the pores of the fabric and coating the threads with materials such as drying oils, rubber, gutta percha and so on. An alternative method was to impregnate the substance of the cloth with hydrophobic materials such as aluminium salts; iron, copper and chromium salts; soaps, waxes, paraffin; gums and gelatine; tannins; albumen, casein; lanoline; alginates.

For instance, vegetable fibres were usually waterproofed with aluminium salts which were cheap, non-coloured and which did not give too harsh a feel to the finished material.

Later it was found expedient to impregnate with the aluminium salt (acetate or formate), squeeze and dry, or, alternatively to use the property of soaps, which precipitate aluminium salts. The standard practice, therefore, became to run the goods through a soap solution and then to pass them directly into a 6° Bé aluminium salt solution without drying. On washing and drying the goods possessed quite a resistant waterproofed effect.

Copper salts have been tried, but have the disadvantage that they impart a greenish tinge to the cloth, and this process is usually reserved for covers, awnings, etc., where the antiseptic qualities of the copper are useful. Linen, too, absorbs copper salts well, forming very resistant lakes with soap. Gelatine and casein have been used, formaldehyde being employed to render them insoluble. The (alkaline) alginates are soluble in water, so that if a fabric is padded with a solution of sodium alginate and then passed into a warm solution of alum or sulphate of aluminium, the insoluble aluminium alginate is deposited on the fibre.

Emulsions in Waterproofing

The greatest advance towards the goal of permanent *porous impregnation* (the ideal waterproof condition) was a result of improvements in the technique of manufacturing emulsions, for once the possibility of making a very fine but stable emulsion of paraffin wax was realised, it was possible, in a one-bath process, to coat the individual fibres of almost any type of fabric, with a thin coating of an extremely hydrophobic substance. Thus there have recently been several standard porous impregnation processes perfected on the basis of such emulsions, the emulsifiers being the triethanolamines or the fatty (higher sulphonated) alcohols.

Mention, however, should be made of simultaneous processing in waterproofing with latex, for this type of completely coated material is essential for certain purposes. Thus, using the 75 per cent. concentrated latex sold under the name of "Revertex," a fabric can be successfully coated with a mixture containing:—30 parts Revertex, 3 parts sulphur, 5 parts zinc oxide, 5 parts 10 per cent. casein solution, and 1 part accelerator.

On subsequent vulcanisation a coating is obtained which does not become "tacky" even under adverse conditions.

Finally, mention should be made of the recent "Velan" process developed by the I.C.I. whereby the nature of the surface of the fabric itself is changed and rendered hydrophobic.

Weighting Silk

The weighting of silk is another branch of chemical finishing where modern chemical developments have improved older methods. On degumming, silk loses 18 to 30 per cent. of its weight, and it is the object of the weighting process to compensate for this loss by impregnating the fibre with foreign materials. Tin salts, aluminium salts, phosphate and silicate of soda, and tannins have all been used, the old method being to impregnate with a stannic chloride solution and to fix the salt in a slightly alkaline bath. This was carried out with the silk in the gum, the subsequent degumming process serving to soften the fibre.

The process of fixing the tin with sodium phosphate, with a final passage through sulphuric acid, then became popular, and a modern process consists of passing the goods through a cold bath of stannic chloride, squeezing, and washing in hard water. The weighting is then fixed in a neutral bath of disodium phosphate. This process can be repeated two or three times if necessary, after which the goods are passed through a final bath of sodium silicate containing a little soap, 10 per cent. on the weight of the goods is added at each passage; three passages, therefore, add 60 per cent. The final passage through sodium silicate adds 40 to 50 per cent., so that it is quite possible to add a total of 87-100 per cent. to the weight of the goods.

In the early days of rayon, it was necessary to dull the hard, artificial lustre of the filaments. Then came the ready-

dulled yarns made by the incorporation of a pigment in the viscose before spinning. Nevertheless, for certain purposes the bright yarns are still preferred, the delustring being done after manufacture, in the piece.

Formerly this was a two-bath process, the general procedure being to impregnate the cloth with a solution of barium chloride, then passing it into a solution of sodium sulphate. On double decomposition barium sulphate was precipitated. Such delustring was, however, superficial and easily removed.

Some progress was made when it was possible to obtain very fine dispersions of titanium dioxide, zinc, lithopone, etc., by using soap as emulsifier, but the most interesting delustring process for piece-goods to date is undoubtedly that developed by the Th. Böhme concern. This makes use of the peculiar properties of cation-active substances such as lauryl pyridinium laurate which are able to deposit a finely divided pigment such as lithopone or titanium dioxide not only on the fibre but within it, so that increased washing fastness of the delustred effect is obtained.

The delustring of acetate rayon has been the subject of a very large number of patents owing to the peculiar nature of the cellulose acetate. These processes specify the use of all sorts of chemicals—sulphates, chlorides, oxalates;

alkaline sulphocyanides; titanium salts in suspension with sulphonated higher fatty alcohols, etc.

In practice a soap bath is generally used containing 10-20 gr. soap per litre. This is not kept too alkaline because of the danger of excessive saponification. Various additions may be made to this bath, amongst them being phenol, cyclohexanol, decaline, pine oils, etc. Pine oil solubilised with a soap solution gives a particularly good effect.

Anti-Mildew Agents

The recent development of a large number of agents exerting an antiseptic effect has been important, since there is a wide tendency to underestimate the damage that is done by bacterial damage in the course of a year. These bacteria are especially present in the sizes and other preparations used during manufacture; especially do they thrive on starchy material in conditions of humid warmth. Many remedies had been tried but all seemed to have disadvantages. The modern agents which seem to have solved the problem are salicylic acid and its derivatives, ethyl and methyl salicylate; fluosilicate of sodium; and the sodium salicylanilide developed by the Shirley Institute and marketed by the I.C.I. as Shirilan NA. The latter has a deservedly high reputation.

Alleged Disclosure of Secrets

Action Brought by British Industrial Plastics, Ltd.

IN the King's Bench Division during the past week Mr. Justice Porter has had before him an action, in which damages were claimed for alleged conspiracy, by British Industrial Plastics, Ltd. (formerly British Cyanides Co., Ltd.), who manufacture synthetic resins and moulding powders, of Ideal House, Argyle Street, London, from their former works manager, Mr. Stephen Walter Doherty, of Pine Walk, Carshalton, and James Ferguson and Sons, Ltd., of Merton Abbey, and Mr. J. E. Ferguson, of Marloes Road, London, W., and Mr. F. A. Ferguson, managing director of Messrs. Ferguson.

Messrs. Ferguson manufacture goods similar to the plaintiffs.

Manufacture of Moulding Powders

Plaintiffs also sought an injunction against the defendants to restrain them from disclosing or making use of plaintiff's secret processes with the manufacture of amino plastic powders.

They further claimed against Mr. Doherty for breach of contract, and Fergusons were sued for inducing the alleged breach.

Mr. Roland Oliver, K.C., Mr. Shelley, K.C., and Mr. G. Aldous appointed for plaintiffs, and Sir Patrick Hastings, K.C., and Mr. Mould for Fergusons, and Mr. Cecil Havers and Mr. W. Wallace for the other defendants.

The defence was that there was no reason to patent the process as it was common knowledge.

Plaintiffs case was that Mr. Doherty was employed by them for some years, and ultimately as works manager. Later he was paid a retainer not to engage in similar work with any other firm. When the agreement expired, in 1934, plaintiffs alleged Doherty entered into the employment of Fergusons. He had also applied for a patent and had assigned his rights to Fergusons for a process for the manufacture of moulding powders. Plaintiffs claimed that this was their secret process on which they had spent some £30,000 in research work since 1934. Plaintiffs process had not been patented for certain reasons.

Plaintiffs claimed that Doherty had undertaken not to disclose their secrets when he was appointed their works manager in 1916. Plaintiffs declared that they had taught the world in the manufacture of amino plastic moulding powders.

After hearing the case, his lordship reserved judgment.

New Source of Refined Antimony

Production to Commence in Canada

THE first commercial production of refined antimony in Canada will take place within the next few months, according to the Department of Mines and Resources, Ottawa. The metal will be produced by Consolidated Mining and Smelting Co., of Canada, at its antimony refinery at Trail, British Columbia, the erection of which is nearing completion.

Small quantities of antimony occur in the silver-cobalt-nickel-arsenic ores which are treated at Deloro, Ontario, and are shipped abroad for further treatment, but that no payment is received for the metal. Other than this, except for small experimental shipments between 1935 and 1931, there has been no production of antimony in Canada since 1917 when there was an output of 361 tons of the ore, valued at \$22,000. Antimony ores and refined antimony were produced intermittently in small lots in the Maritime Provinces for several years prior to 1917.

The plant at Trail will treat flue dust residues from the company's silver refinery, and is designed to handle 10 tons of these residues daily. Stocked dust will comprise sixty per cent. of the charge until the piles have been depleted. Expectations are that in excess of 1,400 tons of refined antimony a year will be produced, which amount is about double that of Canada's annual imports of the metal. The development is timely owing to the difficulties that many countries are experiencing in obtaining adequate supplies of antimony from China—which in 1936 supplied 53 per cent. of the total world output of the metal.

The Newspaper World's 40th Birthday

The Newspaper World celebrated 40 years of publication with a special issue on Saturday. It was actually the biggest issue in the journal's history, and had never before published so large a volume of advertising or given its readers such a comprehensive survey of the newspaper, advertising and allied industries. The issue contains many interesting comparisons between the newspaper practice of forty years ago, and that of to-day. The appeal of *The Newspaper World* is as much to the advertiser as to the journalist. "The growth of advertising during the period," it is stated, "is a fascinating study."

Hydrosulphites and Hydrosulphite-Formaldehydes in Dyeing and Printing

By
HERON WOOD

IF the range of chemicals which come under consideration for use in the dyehouse or print works is reviewed, a group of compounds whose development has been recent and important in both dyeing and finishing is outstanding. These are the hydrosulphites and the hydrosulphite-formaldehyde compounds, whose history has not yet been adequately treated (with the exception of Diserens' book in French on "Progress in the Development of the Vat Colours"), and whose constitution is inadequately understood by the practical man. Without these compounds as they are available to-day, the more interesting applications of the vat colours in dyeing and printing might have been impossible.

The Hydrosulphite Compounds

The hydrosulphites were discovered about the middle of the last century by Schoenbein, and were applied to vat dyeing a few years later by Schutzenberger, who prepared them by reducing a solution of sodium bisulphite with zinc dust. Sodium bisulphite in its pure state, however, was first prepared in 1881 by Bernthsen to whom is due our knowledge of its proper constitution.

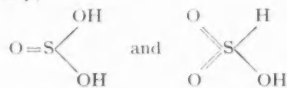
The hydrosulphites are the salts of hydrosulphurous acid having the formula $H_2S_2O_4$, and it was at first thought that the production of sodium hydrosulphite, for example, proceeded according to the reaction:

$Zn + 3NaHSO_3 = Na_2SO_3 + ZnSO_3 + NaHSO_2 + H_2O$. Sodium hydrosulphite was, therefore, represented by $NaHSO_2$. Bernthsen, however, concluded that the formation of sodium hydrosulphite on reduction of sodium bisulphite with zinc was correctly expressed by the reaction.

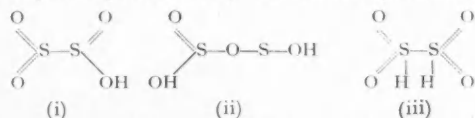
$Zn + 4NaHSO_3 = ZnSO_3 + Na_2SO_3 + Na_2S_2O_4 + 2H_2O$ the formula for the hydrosulphite, therefore being: $Na_2S_2O_4 \cdot 2H_2O$.

To-day it is admitted that sodium hydrosulphite is a salt of a disulphonic acid, according to the following reasoning.

Just as for sulphurous acid we have two possible arrangements, namely,



So, for hydrosulphurous acid, we have three, as follows:—



and as in hydrosulphurous acid the sulphur, it has been shown, must be joined directly to hydrogen, formula (iii), viz., the disulphonic acid, must be the one from which the hydrosulphites are derived.

Industrial Manufacture

The industrial process for the manufacture of sodium hydrosulphite is based on the reduction of the bisulphite by zinc, the reaction being carried out in practice by reacting the zinc with sodium bisulphite in presence of sulphurous acid. The zinc sulphite and the sodium hydrosulphite form a double salt, insoluble in water, so that the product is then treated with milk of lime in order to decompose it. In the process the zinc and sulphurous acid are eliminated. Addition of a solution of common salt now precipitates the hydrosulphite in the form of crystals with two molecules of water of crystallisation.

These are only stable in the very dry state. In solution, sodium hydrosulphite decomposes very easily, atmospheric

oxygen causing the formation equally of bisulphite or bisulphate.

The stability in air of hydrosulphite obtained by saturating its aqueous salt with sodium chloride is poor, and sufficient stability is only obtained by dehydration. The hydrated crystals are brought to a more or less elevated temperature, either in their medium of formation or after filtration, in presence or not of a dehydrating agent such as caustic soda. It is reported, however, that one large concern which prepared the anhydrous salts of hydrosulphurous acid by precipitation with common salt and subsequent heating in vacuo in presence of an inert gas or ammonia, was unable to apply the resulting compound in mordant printing owing to the extreme ease of decomposition of the sodium hydrosulphite in solution. The stability was improved by using a mordant compound of sodium hydrosulphite crushed with glycerine and caustic soda, two earlier commercial products (Eradite B and Rongalite B) being based on this formula.

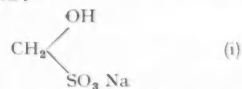
Sodium Hydrosulphite-Formaldehyde Combination

A great step forward was made by the discovery of the combination of sodium hydrosulphite with formaldehyde. It dates back to 1902, and is due to several chemists working independently. C. Kurtz, for instance, recommended the addition of formaldehyde to a colour containing the solid hydrosulphite, and the resulting combination being stable, it was used to mordant paranitraniline red. Independently, E. Zundel remarked that a combination of marked stability was obtained by treating the hydrosulphite with formaldehyde.

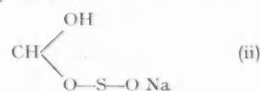
However, in 1900, the Farbwerke de Hoechst had pointed out the improvement in the stability of printing colours (pastes) produced with bisulphite and powdered zinc, when formaldehyde was added; while even earlier Pellega and Zuber recorded the idea of producing the hydrosulphite formaldehyde of zinc by addition of formaldehyde to a mordant with powdered zinc and bisulphite.

Constitution of the Compounds

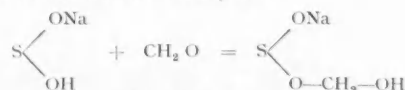
As regards the constitution of these compounds, it has been shown that when formaldehyde acts on sodium hydrosulphite, an equimolecular mixture of two bodies is formed. The first is the bisulphite of sodium formaldehyde, which is a salt of oxymethanesulphonic acid:—



The second is the sulphonylate of sodium formaldehyde, a salt of oxymethanesulphonic acid:—

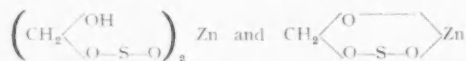


The first possesses no mordant power, but the second is a powerful reducing agent. The hydrosulphurous acid, being a mixed anhydride of sulphurous and sulphylic acids, a satisfactory explanation is given of the formation of the oxymethanesulphonic and oxymethanesulphonic acids. With the formaldehyde the sodium sulphonylate gives the sulphonylate of sodium formaldehyde:—

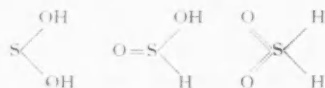


The oxymethanesulphonic acid is monobasic, but the

oxymethanesulphonic acid is dibasic and, therefore gives two series of salts, of which those of zinc are known:—



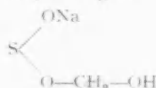
Three structures can be imagined for the sulphonylic acid, a symmetrical, a dissymmetrical and a sulphonic acid form:—



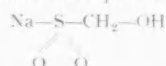
Considerations of Structure

The symmetrical structure does not seem to fit the case of the aldehydic compounds. Of the other two, if the sulphonylic acid has the sulphonic structure it ought to be able to form, by oxidation, the sulphonic acid. It has been shown, however, that on reacting with iodine, the sulphonic group is never formed, but the sulphuric acid instead. However, working with permanganate at 0° C. in presence of magnesium chloride it has been possible to obtain the oxymethanesulphonic acid. To-day, there are two interpretations of the constitution of the aldehyde-sulphonylic compounds.

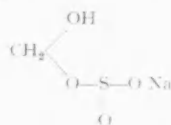
(1) This interpretation derives from the symmetrical form above by esterification, and gives the structure:—



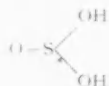
(2) That derived from the sulphonic acid form gives:—



With the bisulphite the formaldehyde gives a sulphurous ester of formula:—



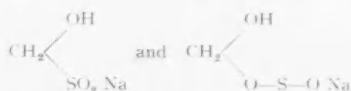
deriving from the sulphurous acid with the symmetrical formula, viz.:—



The conception of a sulphurous ester, therefore, is the one generally adopted to-day for the combination of bisulphites with aldehydes.

Commercial Development

The commercial development of these compounds followed on lines which have been carefully traced by L. Diserens. The first products which were sold were equimolecular mixtures of



and included Hydrosulphite NF, Hydralite A and Rongalite C. The proprietary compounds were prepared either by adding formaldehyde to sodium hydrosulphite or by reduction in an acid medium of the aldehyde-bisulphite compound, using powdered zinc. The sodium hydrosulphite formaldehyde is transparent in aqueous solution into sodium bisulphite formaldehyde and sulphonylate formaldehyde.

It was the B.A.S.F. which first succeeded in making the sodium sulphonylate formaldehyde, according to the author quoted, in the almost pure state, and in 1905 issue Eradite C, and later Rongalite C. The sulphonylate formaldehyde was separated from the bisulphite compound by fractional crystallisation in water and dilute alcohol. According to a later

patent, sodium sulphonylate formaldehyde can be obtained by treating sodium hydrosulphite with formaldehyde in presence of caustic soda:—



One process used at present industrially consists in forming the hydrosulphite of zinc formaldehyde, starting from zinc dust, in aqueous suspension, sulphurous anhydride and formaldehyde at 80° C. After reaction a small quantity of zinc is added, then, by double decomposition with soda a sodium salt is formed which is filtered and evaporated in vacuo.

Three modern compounds on a formaldehyde sulphonylate basis are, therefore: (1) Formosul CP, CW, CL, water-soluble powders which are strong reducing agents, used for stripping and discharging textile materials and in printing with vat colours; (2) Redusol Z or Zinc Formosul, neutral and basic salts of formaldehyde sulphonylic acid, used for stripping and discharging dyed textiles; and (3) Leucotrope O.W., which is dimethylphenylbenzyl ammonium chloride and its disulphinate. This product forms salts with leuco vat dyes and is used for white and orange discharges on indigo and for stripping vat dyes.

Increased Use of Whale Oil

Competition with Vegetable Oils

WHALE oil is now a very serious competitor with vegetable oils in the margarine industry, due to the fall in price following the development of whaling in the Antarctic, states the Imperial Economic Committee's review on "Vegetable Oils and Oilseeds" (2s. 6d.). The United Kingdom net imports of whale oil in 1936 were 149,000 tons, compared with 119,000 in 1935, while the total exports dropped from 24,000 tons in 1935 to 2,000 tons. Exports are chiefly domestic, but in 1935 re-exports amounted to 18,500 tons.

Within the five years 1932 to 1936 the use of vegetable oils for soapmaking increased rapidly, mainly because of the larger proportion of palm oil used. The use of animal fats such as tallow declined. In the margarine industry the main development was the increasing use made of whale oil at the expense of the vegetable oils. For compound lard the chief ingredient is still cottonseed oil, but this has declined in relative importance, and a bigger proportion of whale oil has been used. Consumption in the soap industry steadily increased from 244,000 tons (including resin) in 1932 to 274,000 in 1936. In the margarine industry the consumption of oils and fats fell from 169,000 tons in 1932 to 137,000 tons in 1934. By 1936 the total had recovered to 154,000 tons. The manufacture of compound lard has shown a rapid development.

By weight, soya beans, linseed, ground nuts, and copra are, in that order, the chief oil seeds and nuts entering international trade. Cottonseed and palm kernels are of considerable though lesser importance and palm oil is the principal oil. None of the Empire countries except the United Kingdom is a large importer of oilseeds, but India, in spite of its large output of coconuts and various oilseeds, has in recent years become the chief Empire importer of coconut oil, and has also taken increasing quantities of copra from the neighbouring countries. On balance, the British Empire exported to the rest of the world in 1936 much larger quantities of ground nuts and palm kernels than in 1935 and imported smaller quantities of cottonseed, linseed, and soya beans.

THE sulfidine process for extracting sulphur dioxide from low-grade smelting gases is now being operated by the Kuhlmann concern, under licence from the Lurgi Gesellschaft, of Frankfurt on Main. In this process the sulphur dioxide is absorbed by a mixture of aromatic amines (aniline, toluidine, xylidine, etc.) and water, and the saturated solution heated to 80 to 100° C. when sulphur dioxide in nearly 100 per cent. purity is driven off. The absorbent liquid then separates into 2 layers—water and water-insoluble base. The regenerated base is then available for treating a fresh batch of gas.

Recording and Controlling Instruments

New Models Shown at the Works of the Bristol's Instrument Co., Ltd.

A VISIT was made to the works of the Bristol's Instrument Co., Ltd., at West Twyford, on January 20, in order to view several new instruments which the company has recently introduced. The exhibits were shown on a long stand erected in the works, and opened with a display of some of the types of Bristol's measuring elements. The helical is the heart of the pressure gauge or pressure spring thermometer, and is the most important individual part of the instrument. It covers a range from 15 lb. head of water up to 10,000 lb. per sq. in. Below 15 lb. different forms of element are used. In the ranges 3 in. water to 15 lb. a diaphragm type of element is employed. Between 2 in. and 3 in. a knife edged diaphragm is used, and on ranges below 2 in. the Draught Recorder described later is employed.

Testing the Helical

One instrument was shown with a dead weight tester by which a known pressure is placed on the helical for test and calibration purposes. One of the standard tests of a helical is one million full scale reversals of pressure without signs of fatigue or set. To indicate this a Cycle Controller was shown applying and releasing pressure to a helical, causing it to pulsate.

The next series of exhibits covered the Bristol thermometer and its co-related parts. The thermometer is a direct development from the pressure gauge. Connected to the helical, by means of a fine bore capillary tube, is a temperature sensitive bulb which is filled with either a liquid, a vapour or a gas. By means of the three classes of filling media employed, the Bristol thermometer covers a range from minus 60—1,000° F.

Along with the Standard Free Vane and its associated control valves was shown the Bristol Ampliset Free Vane. This instrument is similar in principle to the standard, but has provision for a sensitivity adjustment. Thus sensitivity of the instrument can be matched on site to the natural process lag of the plant it is controlling. The control valves were said to be ideal for the purpose, giving a straight line valve movement without any lag or hysteresis. In order to operate large butterfly valves, louvres, shutters and other mechanisms of this type, a lever operated motor unit is used. Combined with various measuring systems the free vane controller is offered as a thermometer, potentiometer, pressure, vacuum or draught controller. As a measure of its adaptability it may be mentioned that this instrument in its pressure ranges is

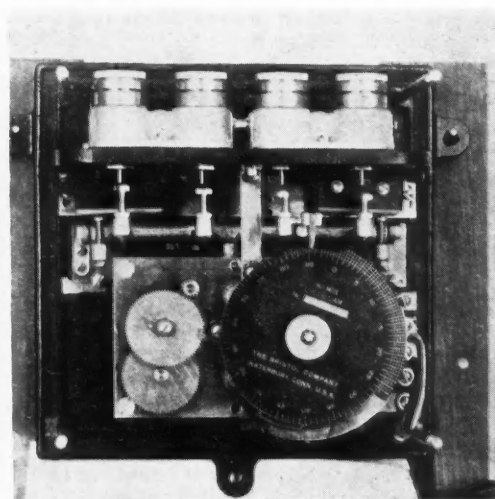
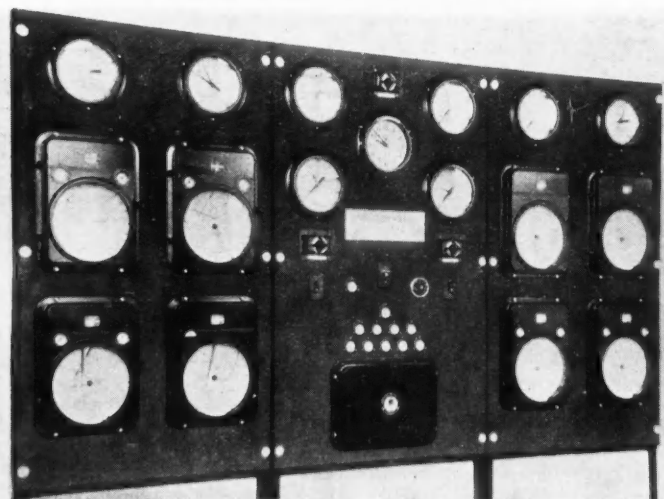
manufactured to control from small draughts of 0.001 in. head of water up to 2,000 lb. per sq. in., and in its temperature ranges from minus 40° F. up to 3,000° F.

A further exhibit comprised the Bristol cycle controller, particularly the new variable speed model. This instrument is equipped with a cam operating one or more leadless pilot valves, which in their turn control the opening and closing of master valves controlling part, or all, of an ideal cycle of operations, thus ensuring that the material being processed is subjected for the correct period of time to the various physical forces laid down by the chemist in the laboratory. The salient feature is a patented two-speed mechanism, which operates without the use of cumbersome gear shifts, governors, springs or escapements. This enables the instrument to carry out a multiplicity of cycles, within range of the cam, regardless of duration and using but a single cam.

Among the cycle controller parts shown, the construction of the air pilot valves so as to be free from stickiness and at the same time be air-tight, was noteworthy. The synchronous motor driving the cycle controller is a very powerful unit of the capacitor type with a high starting torque, and yet only consuming some 7 watts. An air set for cleaning and reducing compressed air to the supply to the instruments was also exhibited.

The Pyromaster

A working model of a chimney stack, the draught on which was being controlled by a draught gauge, was shown. From this was seen the method of utilising the Bristol synchro lever motor to operate a shutter, which, in its turn, varies the amount of draught on the chimney stack. The Pyromaster was also exhibited, recording temperatures of a gas flame. This is a round chart direct marking potentiometer, employing the potentiometer method of measuring thermocouple electromotive force in terms of temperature. The Pyromaster is available as a pyrometer, tachometer, resistance thermometer or millivoltmeter, and it is also manufactured as a controller in ranges from 0-3,000 deg. F. One of the features of the Pyromaster controller is that it uses the pneumatic free vane system to accomplish control. Pneumatic control systems have inherent advantages over electric, as they provide a more flexible control with floating action minimising hunting. Previous to the introduction of the Pyromaster, pneumatic control was not available on higher temperature control applications. It finds applications in the chemical industry, for



Left: Co-ordinated control panel for controlling automatically the operation of solvent recovery plant. Right: Bristol's 4-valve type cycle controller designed for repeating with unerring accuracy any pre-determined cycle of operations.

example, in recording and controlling temperatures in corrosive atmospheres.

A model 90 controller was shown, controlling a small autoclave, the temperature and pressure of which were recorded on a Bristol thermometer and pressure gauge. The controller has been developed to take care of the many requirements for automatic temperature and pressure control that do not warrant a chart record of the controlled temperature or pressure, and also for applications where recording instruments are already in use. It is a small, compact instrument of simple construction, and the outstanding feature is that it is equipped with a precision measuring element.

A Meta-Gauge transmitter was exhibited, the complete Metameter system consisting of two instruments—the transmitter and the receiver. The transmitter is located close to the equipment in which the pressure, liquid level, temperature, flow or motion is to be measured and the reading transmitted. The receiver is located at any distance from the transmitter, and connected electrically to it.

Filling Operations

Machines for Powders, Liquids and Pastes

A RANGE of filling machines has been introduced to the English Market by the Pascall Engineering Co., Ltd., who have been appointed sole selling agents in this country for Wilh. Busse and J. Perl, of Berlin.

The powder filling machines are of two types. One type measures off a definite quantity of powder and discharges it into containers, such as tins, bottles, cartons, etc.; the other type not only measures off the required quantity of powder, but also compresses it into its container. The former is suitable for handling powders of high density where no subsequent stamping or pressing is necessary in order to compress the bulk into a container of given size; the latter is especially useful for handling powders of light texture. The compressing device is readily adjustable for different volumes and is entirely automatic so that once it is set correctly it functions without further attention. The output capacity of these machines ranges from 1,200 up to 2,500 fillings per hour, and the power requirements are quite moderate.

While they employ the conventional pump, for drawing material from the feed hopper and feeding it into the receptacle to be filled, the method of regulating the pump throw—and thereby controlling the dosing capacity—is ingenious. A very high degree of dosing accuracy is claimed; that of the hand-operated type is of the order of plus or minus 0.5 per cent., and for the power driven types 0.05 per cent.

In addition to the simple filling machines, which are available in either hand or power driven versions, there are also automatic and semi-automatic collapsible tube filling measuring, and closing machines, which not only fill the tubes with a measured quantity of material, but also close them and imprint code numbers, dates, etc., on the folds of the tube. The output capacities of all these machines, in terms of fillings per hour, range from 1,200 per hour for the simple hand-operated machine up to 2,000 per hour for the fully automatic power-driven type. The range also includes some hand-operated collapsible tube closing machines, of which the simplest version will close 800 tubes per hour with either two or three folds, whilst a more elaborate model will close 500 tubes per hour by one rotation of the operating crank.

So far as bottle filling is concerned, every need can be met from the range of machines available. A single filling valve will handle 300 bottles per hour; a multiple head machine is capable of filling 4,000 bottles per hour. The single valve, known as the "Unifiller," is made of nickel-plated brass, the filling tube being of pure nickel, and it is usually connected by a rubber tube to a gravity feed tank. It is automatic in operation, in that it opens as it is applied to the bottle and closes immediately on removal. There is, therefore, no

(Continued in next column.)

Bristol's new low range draught and pressure recorders are offered for measuring and recording extremely low pressures, and vacuum. They are furnished with a minimum total range of 0.2 in. water across the scale of a 12 in. chart, and are offered with maximum range of 2.0 in. H.O.W. across the chart. The instrument is a practical one built for severe industrial use. It is equipped with a moisture, fume and dust-proof case, and is built to operate under the heaviest plant conditions. The measuring element of the low range pressure recorder consists of an inverted oil-sealed bell balanced through a lever arm by means of a pressure spring. The pressure to be measured is exerted on the under side of the bell and causes it to move in proportion to changes in pressure. It is said to be responsive to changes of a fraction of .001 in. water.

The low range draught and pressure controller employs the free vane Ampliset system of pneumatic control, coupled with the measuring mechanism used in the recorder described above.

Colour Measurement Practice

Direct and Indirect Methods

COLOUR measurement formed the subject of an address which Mr. R. Donaldson, of the National Physical Laboratory, gave before the Liverpool Section of the Society of Chemical Industry on January 21. The chairman of the Section, Professor T. P. Hilditch, presided.

In the practice of colour measurement, said Mr. Donaldson, two distinct methods were followed, the direct and the indirect. In the direct method a trichromatic colorimeter was employed. By mixing three colours together, a colour was produced by the colorimeter which could be made to match the colour of the specimen. Using the colorimeter the specimen colour, and the colour produced by itself, was presented to the eye under the most favourable condition for making a colour match. From the reading at the matching position, was derived directly the measurement of the colour in terms of the colorimeter colours and it was only a matter of transformation to put the result into the accepted standard form. This method had the advantage of being adaptable to every colour, and did not require expensive equipment. At the present moment it seemed the most suitable method for general colour measurement.

In the indirect method a complete spectrum analysis of the colour was first made, and then the results were reduced by calculation to the trichromatic system. It was a purely objective method and did not depend on the properties of any real observer. The reduction, by calculation, of the spectrum analysis was equivalent to the part played by the observer in the direct method. Certain properties of our colour vision are introduced into the calculation in the form of three columns of figures called "the colorimetric properties of the normal observer." The results were the same as the fictitious normal or average observer would have got using a trichromatic colorimeter. As a general method for routine work, however, it is not very suitable. It took too long and was not easily adapted to every kind of specimen. It was only fitted for special occasions like the investigation of colour standards.

(Continued from preceding column.)

wastage of material and it calls for no particular skill in operation. The "Twinfiller" is provided with an elevated pressure tank of 4 gallons capacity, mounted on a rigid column, and fitted with twin filling valves, thus forming a self-contained unit. The apparatus is adjustable to accommodate different sizes of bottles, and it can be arranged for filling both sprinklerneck and cork stopper bottles. The twin filling valves operate independently of each other and are not only automatic in operation, but are provided with filling height adjustment, so that overfilling of the bottles is impossible.

The Special Areas and the Activities of Scottish Industrial Estates, Ltd.

A Statement by Sir Steven Bilsland, Bt., M.C.

THE Scottish Industrial Estate exists to solve the problem of unemployment in the Special Areas. The problem of the Special Areas when viewed as a whole and in its national setting is related to another big national problem—that of Greater London.

A Service to London and the South

Statistics from the Third Report of Sir Malcolm Stewart as Commissioner for the Special Areas—a remarkable document—show that Greater London has 1/127th part of the area, 1/5th of the population and nearly a quarter of the rateable value of Great Britain. The population of London increased during the two years 1932-34 by 226,000; during the same period the increase of population for the whole of the rest of the country was only 40,000. Greater London has, moreover, become highly industrialised, which is quite a new phase. The percentage increase in the number of insured workers in London between the years 1929-31 was 11.4. During 1935, 213 new factories were opened in Greater London: there were only 2 factories opened and 6 extensions in the whole of the Special Areas; in Wales there were no new factories and no extensions during that year. (These statistics give significance to the progress already made on the Scottish Industrial Estate. Nearly 50 producers have taken factories or factory sites on what, as late as June of last year, was nothing but a piece of countryside). These figures speak for themselves. In trying to put the case for the Special Areas before Londoners we claim to be doing a service to London and the South.

How are new industries (and branches or subsidiaries of existing industries) to be attracted to the Special Areas? There are only two methods: Persuasion and Inducements. As indicated in Sir Malcolm Stewart's Third Report, Persuasion has been tried and failed. Accordingly, the Government has experimented with inducements, and inducements of a remarkable and substantial character. It has been made well worth an industrialist's while to settle in the Special Areas. These inducements are of three kinds. First, the Special Areas Reconstruction Association, Ltd. (an undertaking with which the Government is associated, and which works in close co-operation with the Scottish Industrial Estate Company) will, in approved cases, make substantial advances to cover the cost of plant, machinery and working capital. Tenants on the Scottish Industrial Estate are eligible for such loans. They are also eligible for very valuable concessions which the Commissioner for the Special Areas is empowered to grant under the Special Areas Act of last year. He may contribute substantially towards a tenant's rent, rates, income tax and National Defence Contribution. The third inducement is the provision of new factories—built, if desired, to a manufacturer's own specifications—on lease, and requiring no outlay of capital.

Facilities of the Scottish Industrial Estate

The Scottish Industrial Estate is a modern trading estate, laid out on garden-city lines, with railway sidings, main and service roads, canteens and all services—including steam, generated and distributed under a centralised scheme, for both heating and process work. The promoters chose the site of the estate very carefully, having particular regard to the two factors of marketing and labour. It is situated within half a mile of the docks of the River Clyde, and lies in the heart of the tremendous Clydeside industrial market. It is surrounded by large reserves of industrial labour, which is as fine as any in the country. Moreover, as is not the case in the South and Midlands of England, an ample supply of skilled labour is available.

A manufacturer can lease "standard" factories on the

estate at an annual rent of £50 and upwards. Alternately, if his requirements cannot conform to standard, the estate will build a factory for him in accordance with his own specifications. Or again, a producer can take a factory site, owning and erecting the factory himself. I must emphasise one point: as the Estate Company does not operate for profit, all rents are very low being computed on a purely economic basis—that is, they represent simply annual outgoings and financial charges in relation to capital cost.

We exist to reduce unemployment in the Special Areas. We often stress the point that the Scottish Industrial Estate affords a magnificent chance for the small man. It does indeed. But at the same time, it is not the small man who is going substantially to solve the problem of unemployment. For the solution of that problem we look to national industry as a whole, to businesses and industries all over the country—and particularly to the big mergers, many of which are controlled from London.

With the object of bringing the facilities available on the Scottish Industrial Estate to the notice of people in the South, we propose this spring and summer to inaugurate an advertising campaign. This campaign will be, to a certain extent, related to the Empire Exhibition in Glasgow next summer. All Scotland hope that this exhibition will attract as visitors business men from England, the Empire and foreign countries, and it is with a view to bringing to the notice of these visitors the problems which exist in the Special Areas in Scotland, the steps which are being taken for the alleviation of these problems, and lastly and most important the facilities and advantages which exist there for the enterprising manufacturer that I appeal to the Press for their co-operation. I only do so because I am convinced that we are performing a duty of national importance.

Helium in Beryl

An Investigation of its Occurrence and Origin

THE occurrence of helium in beryls was the subject of a communication to the Royal Society by J. W. J. Fay, E. Glückauf, and F. A. Paneth, on January 27.

Various specimens of old beryllium metal were analysed for helium, but as the method employed, in spite of its sensitivity, failed to detect any traces of helium it was concluded that the spontaneous production of helium in beryllium is less than 1.3×10^{-11} c.c. of helium per gram beryllium per year. From this figure it follows that the helium content of beryls cannot be explained as a consequence of the spontaneous disintegration of a beryllium isotope of mass eight. Even the assumption that such a beryllium isotope has been present in previous geological periods and now mostly decayed is not compatible with the very low limit found for present-day helium production.

In recent years the helium content of beryls has been attributed to the influence of γ -rays from radioactive minerals in the neighbourhood of the beryls, and to cosmic radiation. From figures obtained in an investigation by E. Glückauf and F. A. Paneth, of the amount of helium produced in beryllium by γ -rays it follows that the influence of the natural sources of γ -radiation is not nearly sufficient to explain the helium content of beryls. Since beryllium does not produce adequate amounts of helium, either under the influence of external radiation or as a consequence of spontaneous disintegration, it seems that the helium content of beryl is not connected with its beryllium content at all, but is due to some other chemical element.

Midland Chemists' Committee

Honour Conferred on Mr. W. A. S. Calder

THE Midland Chemists' Committee, which was formed about twelve years ago with the object of bringing about co-operation between the various chemical societies in the Midlands, has elected Mr. W. A. S. Calder, a director of Imperial Chemical Industries, Ltd., as its permanent president. It is the first time in the history of the committee that the office has been filled. By its rules the committee may from time to time elect to the office of president or vice-president a member of the constituent societies who, by virtue of his services to chemistry and the esteem of his fellows, is deemed worthy of the honour. Mr. Calder, who is going into partial retirement, has left the district to live at Worthing.

The good wishes of his fellow-members were expressed to Mr. Calder in Birmingham on January 22, at the annual dinner and dance organised by the Midland Chemists' Committee, when the appointment was publicly announced.

Dr. W. Cullen, president of the Institution of Chemical Engineers, proposed the toast of "The Midland Chemists," and coupled with it the name of Mr. Calder, who had been created president as a mark of esteem.

Mr. Calder, acknowledging the toast, said they regretted the absence of Professor Haworth, whose doctor had ordered him a complete rest. Referring to the scheme of the Chemical Council for a united front, he said that as chemists they were longing to present a united front. No one was keener than himself, but he always remembered the words of Mr. William Hunt, "Never go too fast for good work." One saved no time by being too precipitate. He felt the kindness of the Midland Chemists in electing him president. Experience had shown him that their friendship was of no ordinary character.

Professor R. H. Hopkins, chairman of the committee, proposed the toast of "The Guests." He said that in electing Mr. Calder president—a permanent office—the committee had been looking after itself. They intended to attach him permanently to the Midland Chemists' Committee. Offering congratulations to Professor Haworth on the award of the Nobel Prize, the speaker said his fellow prizewinner, on returning from Stockholm to his own country, had received a true Magyar welcome.

Professor W. Wardlaw responded to the toast and Mr. George King, honorary secretary, proposed the toast of "The President."

The World's Petroleum Industry

DR. A. E. DUNSTAN, chief chemist of the Anglo Iranian Oil Co., Ltd., discussed the position of the oil industry of the world, at Rotherham on January 19, in the first of a series of lectures arranged by the Rotherham College of Technology. He briefly described methods by which oil is discovered, drilling, pumping, the construction of pipelines, operations involving the separation of oil from dissolved gas, the ultimate treatment of "crude" for a multiplicity of useful products. He particularly emphasised the fact that the oil industry was concerned with putting on the market finished and refined material; that for crude oil as "crude" there is no outlet. He also dealt with the utilisation of natural gas, and indicated how this material could give aromatic hydrocarbons, solvents, alcohols and ethers, as well as very highly specialised fuels of super-efficiency for use in aircraft engines. Petroleum now formed the basis of a chemical industry comparable with that which has been built up from coal tar.

THE Deutsche Gold- und Silber-Scheideanstalt, of Frankfurt-on-Main, in their report for the year ending on September 30 last again shows an increased gross profit of 37.5 million marks (previous year, 33.2 million) and a net profit, including carry-forward, of 5.5 million marks (4.3 million), from which a dividend of 9 per cent. is again distributed.

A New Indian Chemical Company

Manufacture of Sulphuric Acid and Fertilisers

AN important new Indian chemical manufacturing company, Mysore Chemicals and Fertilisers, Ltd., with a capital of £187,500, starts its career under excellent auspices, as the State Government has assumed an official interest in its welfare by taking up 25,000 shares.

The company has been formed principally with the object of manufacturing heavy chemicals and fertilisers. The Government of Mysore have for some time past been considering the manufacture of sulphuric acid to help the establishment of further chemical industries in the State, apart from which the establishment of the sugar factory at Mandya and the development of the cultivation of cane has created a steady demand for ammonium sulphate. At present the major portion of ammonium sulphate consumed in India is imported, the balance being manufactured as a by-product at coke-oven plant; imports, however, have increased at a rapid rate during the last five years.

The State Government will have considerable control over the management of this company, as they have the right to nominate three directors and are entitled to appoint the managing director.

Ten Years Back

From "The Chemical Age" of January 28, 1928

TWENTY-THREE companies were, in the year 1927, registered in Scotland in connection with the oil, colour and chemical trades, involving a total capital of £477,900, as compared with twenty-eight companies of a similar character with a combined capital of £313,700 during the previous year.

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The Chemical and Metallurgical Corporation announces that the installation of the hydrochloric acid plant at the Corporation works now being erected at Runcorn, on the Manchester Ship Canal, has been completed. The plant is producing acid which is readily absorbed by the extensive local market. The Corporation's treatment of platinum concentrates from the Transvaal has proved successful.

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An influential Lancashire syndicate is stated to have completed contracts preliminary to the establishment of an artificial silk factory on Orchard's Factory Estate, Long Eaton, Derbyshire. The main factories are to be converted for the new purpose, and equipped with the latest machinery for the manufacture of artificial silk. The re-equipment of the factory is to begin at once. Some 2,000 hands will be employed.

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The import into Russia of about 240 chemical products now manufactured in that country has been prohibited. These products include certain bacteriological dyes and their components, and a considerable number of chemicals for use in metallurgical industries, in testing gases and water, and in photographic developing agents, etc.

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It has been definitely decided by Sugar Industry Auxiliaries, Ltd., to erect a beet sugar factory at Brigg, Lincolnshire. The factory, which will cost £360,000 and will have a capacity of 1,000 tons of beet per day, will be built by Stewart and Partners, Ltd., acting in conjunction with the Hallesche Maschinenfabrik und Eisengiesserei. The consulting engineers are Mr. A. J. V. Underwood and Messrs. Heron Rogers and Pettit.

A NEW textile has been derived from fish albumen by Professor Mecheel, of the German Textile Research Institute, in Association with the Deutsche Eiweiss-Gesellschaft. When woven with 80 per cent. of cellulose fibre it gives a wool-like material of hard-wearing qualities.

Personal Notes

MR. C. V. METCALFE, chief chemist to the Charlaw and Sacriston Collieries, Ltd., is leaving this firm, at the conclusion of nine years' service, to take up a post with the Rand Refinery Co., South Africa.

MAJOR E. IVOR DAVID, of Cardiff, was elected president of the South Wales Institute of Engineers at the annual meeting of the Institute in Cardiff last week. He succeeds Professor Frederic Bacon, Swansea.

THE EARL OF BESSBOROUGH has consented to act as president of the Health Congress of the Royal Sanitary Institute, which is to be held at Portsmouth, July 11-16. The congress will include a section dealing with preventive medicine.

THE LATE SIR SAMUEL INSTONE, chairman of the Askrn Coal and Iron Co., the Bedwas Navigation Colliery Co., and S. Instone and Co., and a director of British Benzol and Coal Distillation, left estate of the gross value of £1,034, with net personalty £738.

MR. G. S. POUND, M.Inst.P.T., has been appointed manager of the Barugh works and coal oil plant of Low Temperature Carbonisation, Ltd., and also chief chemist for all the company's works. Mr. Pound has been with the company for the past ten years.

MR. ERIC RICHARD WALLAGROVE, of Leamington College, and MR. GEORGE MCCONNELL, of Liverpool Collegiate School, have been awarded open scholarships for chemistry at Jesus College, Oxford. A Welsh Foundation scholarship for chemistry, also tenable at Jesus College, has been awarded to MR. H. J. V. TYRRELL, of Newport High School.

THE LATE DR. JOHN AUGUSTUS VOELCKER, who was consulting chemist to the Royal Agricultural Society for more than fifty years, has bequeathed £100 to the Society of Public Analysts and £100 to the benevolent fund of the Institute of Chemistry. He left estate of the gross value of £24,057, with net personalty £23,864.

DR. FRANZ FISCHER, inventor of the Fischer-Tropsch system, arrived at Cape Town on January 24. Dr. Van der Bijl, chairman of the State Steel Works and the Electricity Supply Commission, announced that the question of making petrol from coal by the Fischer-Tropsch system was being considered.

DR. J. A. PRESCOTT, professor of agricultural chemistry in the University of Adelaide, has been appointed director of the Waite Institute, where he succeeds Professor Richardson, who has been appointed deputy chief executive officer of the Commonwealth Council for Scientific and Industrial Research. Since his arrival in Australia in 1924 Professor Prescott has travelled extensively in connection with soil research, of which he is considered to have an unrivalled knowledge.

MR. B. CRITCHLEY, of Blackburn, MR. S. B. TIPLADY, of Rishton, and MR. W. COOK, of Darwen, who have had a long connection with the Walpamur Co., of Darwen, in association with Mr. A. Southworth and Mr. J. C. Southworth, of Glitheroe, have formed a new company under the name of Ribble Paints and Varnishes, Ltd. They have purchased the Fountain Brewery at Redcap, and intend to equip it for the manufacture of high-class paint, varnish and enamel. Production is expected to start by the beginning of March, with 30 employees.

MR. ROGER RENAUD has been awarded the Montyon prize of the Paris Academy of Sciences for 1937, in recognition of his work on gas masks for use in unhealthy trades. M. Gustave Vavon has obtained the Jecker prize for work on catalytic hydrogenation and the stereochemistry of the cyclic compounds. Other awards for 1937 include:—The Cahours Foundation prize to M. Georges Laude, for his work on the synthesis of cyanic acid; the Berthelet prize to M. Jacques Parrod, for researches on the synthesis of hydrocyanic acid; the Houzeau prize to M. Marius Picon, for work on sulphides and camphocarboxylic acids.

THE LATE MR. WALTER JAMES CROOK, of Walter J. Crook, Ltd., dealers in fine chemicals, left estate valued £16,460, with net personalty £3,154.

SIR PADAMJI PESTONJI GINWALA has been appointed to the board of the Steel Corporation of Bengal in place of Sir Josna Ghosal, who has resigned.

THE LATE MR. GEORGE HARRY PERRY, of Pedmore, who was chairman of Mobberley and Perry (Stourbridge), Ltd., fire-brick manufacturers, has left estate valued £30,506, with net personalty £13,344.

THE LATE MR. THOMAS OSWALD SAUNDERS, of Dulverton-mansions, Gray's Inn Road, W.C., and West-gate Chemical Works, Cleckheaton, Yorks, chemical manufacturer, has left £25,244, with net personalty £24,871.

DR. WILFRID DEVONSHIRE SPENCER, Ph.D., B.Sc., F.I.C., has been appointed head of the Research Department of Low Temperature Carbonisation Ltd. Dr. Spencer is well known in the coal oil world, having been with Imperial Chemical Industries, Ltd., for seven years, during which time he spent



Dr. W. D. Spencer

three years as assistant to Mr. Kenneth Gordon, at Billingham, working on the development of the coal hydrogenation process and other coal oil problems. Dr. Spencer will also be in charge of the new research laboratories of Low Temperature Carbonisation, Ltd., in London, which are being equipped to deal with several new developments in connection with the coal oil and chemical departments of the company's business.

DR. E. W. RUSSELL has been appointed Goldsmiths' Company's soil physicist at the Rothamsted Experimental Station, in succession to Dr. G. W. Scott Blair, who has been appointed head of the dairy chemistry department at the National Institute for Research in Dairying, Shinfield, Reading.

LORD MCGOWAN may shortly relinquish his post as managing director of Imperial Chemical Industries, Ltd., but will continue as chairman. The board is considering the appointment of a number of managing directors, each of whom would be responsible for one section of the company's business. Lord McGowan will then preside over this committee.

OBITUARY

MR. HARRY STOCKER, one of the pioneers of the china clay industry, has died at St. Austell, at the age of 70. He was a joint managing director of the West of England and Great Beam China Clay and Stone Co.

Foreign Chemical Notes

Italy

PLANT FOR THE MANUFACTURE OF CADMIUM and its salts, from zinc residues, is being erected at Linate by the Appula S.A., of Milan.

INSECTICIDES ON A COPPER OXYCHLORIDE BASIS will be produced at a new plant of the Etruria S.A. Prodotti Chimici per l'Agricoltura, of Florence.

From Week to Week

THE BRITISH ALUMINIUM CO. are to build 150 houses for their workers at Fort William.

L. LIGHT AND CO., LTD., has issued a new price list of fine chemicals, many of which are of special interest to research workers.

THE EXHIBITION DEPARTMENT OF THE C.W.S. SOAP, CANDLE AND GLYCERINE FACTORY, at Irlam, was badly damaged by fire last week.

JOJO RUBBER AND WATERPROOFING CO., LTD., are to make alterations and additions to their dyehouse at Netherton Works, Anniesland, Glasgow.

CONSOLIDATED RUBBER MANUFACTURERS, LTD., have moved their offices to Belvedere Works, Kent. Telephone: Erith 2681. Telegrams: Genrubco, London.

A VIOLENT EXPLOSION OCCURRED at the Nobel's Explosive Works of Imperial Chemical Industries, Ltd., at Ardeer, Ayrshire, on Thursday. At the time of writing, it was stated that six men were killed and several injured.

THE ENGAGEMENT IS ANNOUNCED between Mr. H. A. S. Townshend, warden of the John Benn Hostel, Stepney, and King George's House, Stockwell, and Miss F. V. M. Waller, appeal secretary.

A NEW THERMIONIC AMPLIFIER for adapting a present potentiometer to glass electrode measurements has been introduced by Leeds and Northrup Co., of Philadelphia. It is useful for measuring potentials encountered in polarisation studies.

THE SECRETARY FOR MINES has announced the termination by the licensees of two oil prospecting licences to the Darcy Exploration Co., Ltd. The licences covered areas in the counties of Southampton and Sussex, and were granted in November and December, 1935.

THE LATEST BOOKLET of Glyco Products Co., Inc., New York, contains a number of additional features. A complete index of products, formulae, and uses makes it very easy for chemists and technical workers to find any particular piece of information they are requiring. A number of new products are also described.

THE BIRMINGHAM OFFICE OF THE UNITED STEEL COMPANIES, LTD., was recently moved from the old Martino Steelworks in Princip Street, to a modern suite of offices in the centre of the city, readily accessible from both New Street and Snow Hill stations. The new address is Union Chambers, Temple Row, Birmingham, and the telephone number is Midland 6321.

THE FIRST SHIPMENT OF NICKEL ORE from the Netherlands Indies will take place this month. The Oost Borneo Co., which owns nickel concessions on the Island Celebes, will export 1,000 to 1,500 tons to Germany. It is understood that these ores are to be used by the Krupp organisation for experimental purposes and if these prove successful further shipments are possible.

FOLLOWING THE RECENT SUCCESSFUL PRODUCTION of "Ambrose Applejohn's Adventure," at the Cripplegate Theatre, London, the Johnson Matthey Dramatic Society will shortly present Ivor Novello's "Full House," at the Guildhall Theatre on April 9. Tickets may be obtained from the Secretary of the Society, at the offices of Johnson, Matthey and Co., Ltd., 73-82 Hattou Garden, E.C.1.

AN OFFICIAL PROTEST WAS LATELY MADE to the Post Office authorities by the Union of Postal Workers, regarding the quality of soft soap supplied for general purposes. Samples of this soap were therefore submitted to the Government chemist for testing. His report was to the effect that regarding solubility, the subject of complaint, there is practically no difference in comparison with samples received under a previous contract.

WORLD RAYON PRODUCTION DURING 1937 totalled 1,725,000,000 lb., compared with 1,305,000,000 lb. in the previous year. Of this total, filament yarn accounted for 1,125,000,000 lb., and staple fibre for 600,000,000 lb., compared with 1,006,000,000 lb., and 299,000,000 lb. during 1936. Japan was again the leading producer, supplying 325,000,000 lb. of filament yarn and 175,000,000 lb. of staple fibre. The United States was second with 312,000,000 lb. and 20,000,000 lb.

A SERIES OF EXPLOSIONS wrecked a synthetic rubber factory of the Du Pont Company at Deep Water, New Jersey, on January 24. Two workmen were killed, another was severely injured, and the company suffered a loss of property amounting to \$400,000 (£80,000). The process employed by the company is based on discoveries made by the late Rev. Julius Nieuwland, of Notre Dame University, in experimenting with acetylene compounds. Because of the great volatility of the elements employed in the work, elaborate precautions are taken to prevent the generation of sparks, or even the intrusion of a draught of air. What caused the present disaster is not known, but the last of the nine explosions were from two 10,000 lb. holders of acetylene gas.

THE BRITISH OXYGEN CO., LTD., have completed negotiations for the purchase of a site at Annat, near Corpach, Fort William, where they propose to erect their calcium carbide factory.

IMPORTANT DEPOSITS OF ZINC, LEAD AND NICKEL have been found near Valjevo, South Serbia. It is believed that the nickel is sufficient to make Yugoslavia independent of imports.

THE POSSIBILITY OF EXTRACTING IRON from slag tipped in past years at Grangetown, near Middlesbrough, is being investigated by a London firm. The experiment is prompted by the high price now commanded by scrap metal. Attempts on the same lines some years ago proved unsuccessful.

"LIGHT METALS," a new Temple Press publication, deals with the production, treatment, uses and potentialities of light metals and their alloys from the point of view of the metallurgist, the designing engineer and the ultimate user. It will be published during the fourth week of each month, priced 1s.

A VARIETY OF HEAVY MILD STEEL PLATEWORK executed by Head, Wrightson and Co., Ltd., is illustrated in a new folder issued by the company. One of the illustrations shows a Ruggles Coles rotary dryer specially adapted for the drying of difficult materials with minimum fuel consumption and negligible dust losses.

THE BRITISH IRON AND STEEL FEDERATION will hold their annual banquet at Grosvenor House on March 17, when Lord Greenwood (president-elect of the Federation) will preside. Sir Thomas Inskip, Minister for the Co-ordination of Defence, and Mr. W. S. Morrison, Minister of Agriculture, will be the principal guests.

WAGE INCREASES VARYING FROM 1d. TO 4d. PER WEEK will be paid to approximately 80,000 operatives in the dyeing and finishing industries of Yorkshire, Lancashire, Cheshire, Derbyshire and parts of Scotland on the first pay-day in February, in consequence of the rise of one point in the official cost of living index figure on January 1 (59), compared with the percentage in October last.

THE OFFICIAL PRICE OF PLATINUM has been reduced. The new quotation is £7 per ounce, a drop of 12s. 6d., which makes the official price of the metal approximately the same as that of gold. Successive reductions in the price from its level of £104 per ounce three months ago have failed to revive the demand which remains dull. The official price was last £7 per ounce in June, 1936, since when it has touched £14.

GREAT HOPES ARE SET on the success of the new Italian artificial fibres such as Lanital, an artificial wool which is made from milk. That Lanital has a future in the world is shown by the fact that it is being manufactured under licence in several foreign countries, including Germany, Austria and Poland. Manufacture is shortly to begin in France and Great Britain, where the manufacturing rights have been bought by Courtaulds.

THE CANADIAN DEPARTMENT OF NATIONAL REVENUE announces that an Order in Council, dated December 29, 1937, passed under the authority of Section 284 of the Customs Act, establishes that coal-tar benzol, when imported by refiners of crude petroleum, for use only in blending with gasoline wholly produced in Canada, will be subject to the following tariff from January 1 to April 30, 1938: British preferential tariff: free; intermediate tariff: 10 per cent.; general tariff: 20 per cent.

A 30 PER CENT. RISE IN IMPORTS is the most noteworthy feature of Germany's foreign trade returns for 1937. The development of synthetic materials did not prevent imports of raw materials from increasing by 27 per cent. The rise in exports, amounting to about 25 per cent., did not keep pace with the heavy increase in imports. In all, imports totalled £455,660,000 and exports £492,580,000, leaving on paper an export surplus of £36,920,000, compared with one of £45,830,000 last year.

PRESIDENT ROOSEVELT HAS APPROVED REGULATIONS made by the Department of the Interior, United States, prohibiting the sale of helium until the Government have acquired new supplies. Orders for helium cannot be accepted until the agreement has been executed providing for the sale to the United States Government of privately owned helium properties in Kansas and Colorado. Meanwhile, a German steamer is held up in an American port waiting to carry back helium supplies for the new German Zeppelin.

WITH THE DECEMBER SHIPMENTS OF CHINA CLAY, 1937 has been the best trading year since the war. Total shipments of china clay and china stone have reached 938,000 tons, closely approaching the peak of production achieved by the china clay industry in 1912, when it rose to a million ton level. The past year has been notable also for the improvement in the labour conditions, an increase in wages, the introduction of holidays with pay, and for last Christmas a generous bonus to the employees was made by two of the largest firms. Since the introduction of the Research Department, china clay, as a product, has been improved and many new uses have been developed.

THE CHEMICALS COMMITTEE of the Glasgow Junior Chamber of Commerce is inquiring into the possibility of preparing a detailed report of the chemical manufacturing firms in the Glasgow district.

SEVERAL THOUSAND POUNDS DAMAGE WAS CAUSED by an outbreak of fire at the Lilyburn Works, Milton of Campsie, belonging to Universal Pulp Containers, Ltd. One and a half million pulp containers used for all types of bottles were lost.

Inventions in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Applications for Patents

ELECTROLYTIC PRODUCTION OF ADHERENT NICKEL DEPOSITS.—G. W. Johnson (I. G. Farbenindustrie.) 901.
MANUFACTURE OF OLEFINE OXIDES.—G. W. Johnson (I. G. Farbenindustrie.) 902.
MANUFACTURE OF WATER-SOLUBLE POLYMERISATION PRODUCTS.—G. W. Johnson (I. G. Farbenindustrie.) 903.
SEPARATION OF NICKEL AND COPPER.—G. W. Johnson (I. G. Farbenindustrie.) 1046.
AZO COMPOUNDS.—Kodak, Ltd. (United States, Jan. 14, '37.) 477; (United States, Jan. 14, '37.) 478; (United States, Jan. 14, '37.) 479; (United States, Jan. 14, '37.) 480; (United States, Jan. 23, '37.) 481.
MANUFACTURE OF *p*-CARBAMIDE-BENZENESULPHONAMIDE.—E. Lilly and Co. (United States, Jan. 23, '37.) 728.
MANUFACTURE OF DIARYL DERIVATIVES.—May and Baker, Ltd., A. J. Ewins, and H. J. Barber. 1074, 1075.
MANUFACTURE OF STEEL.—F. P. Mehta. (British India, Jan. 21, '37.) 855, 856.
HEAT-RESISTING ALLOYS.—A. M. C. Murphy. 474.
MANUFACTURING EXTREME-PRESSURE LUBRICANTS.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. (France, Jan. 16, '37.) 448.
PURIFICATION OF LIQUIDS.—Naamlooze Vennootschap Octrooien Maatschappij Activit. (Holland, Jan. 11, '37.) 753.
MANUFACTURE OF PLASTIC MASSES.—L. C. F. Pechin. (Belgium, Jan. 7, '37.) 515.
TREATMENT OF RESINS.—R. F. Powell. 849, 850.
MANUFACTURE OF SALTS.—Procter and Gamble, and A. O. Snoddy. 1051.
MANUFACTURE OF ORGANIC PRODUCTS.—T. Shedden, and Imperial Chemical Industries, Ltd. 942.
PREPARATION OF ETHYLENE OXIDE, ETC.—Soc. Carbochimique, P. Ferrero, C. Vandendries, and F. Berbe. 409.
MANUFACTURE OF DIPHENYLAMINE.—Soc. des Usines Chimiques Rhone-Poulenc and I. Serriabine. 1072.
POTASH CARTRIDGES for oxygen respirators, etc.—Spolek pro Chemickou a Hutni Vyrobu. (Czechoslovakia, May 8, '37.) 852.
PURIFICATION OF BETA-PHENYLETHYL ALCOHOL.—W. J. Tennant (Dow Chemical Co.). 930.
ALUMINIUM ALLOYS.—W. H. A. Thiemann (I. G. Farbenindustrie.) 765.
TREATMENT OF SOLID MATERIALS with solvents.—H. M. Torrilhon. (France, Jan. 11, '37.) 844; (France, March 26, '37.) 845.
COMPRESSORS FOR CHLORINE GAS.—W. W. Triggs (Armaturen und Maschinenfabrik, A.-G., vorm. J. A. Hilpert.) 1008.
RECOVERY OF SULPHUR from used gas.—Dr. A. Wacker Ges. für Elektrochemische Industrie. (Germany, Jan. 9, '37.) 563.
TREATMENT OF FERROUS METALS.—Wild-Barfield Electric Furnaces, Ltd., E. P. Barfield, and J. E. Oram. 644.
MANUFACTURE OF WATERPROOF TEXTILE WEBS.—E. Andreac and Jung and Simons. (Germany, Jan. 16, '37.) 1566. (Germany, Jan. 7, '37.) 1567.
ELECTRODEPOSITION OF RHODIUM.—R. H. Atkinson. 1535.
MANUFACTURE OF STEEL, ETC.—A. Auriol. (Belgium, Jan. 19, '37.) 1178. (Belgium, March 5, '37.) 1179. (Belgium, April 16, '37.) 1180. (Belgium, Dec. 9, '37.) 1181.
CATALYTIC OXIDATION PROCESSES.—E. Berl. (Feb. 25, '37.) 1369.
PREPARATION OF ORGANIC NITROGEN DERIVATIVES.—Boots Pure Drug Co., Ltd., and F. L. Pymann. 1226.
MANUFACTURE OF AMINO-ARYLSULPHOXIDES.—A. Carpmal (I. G. Farbenindustrie.) 1221.
MANUFACTURE OF SULPHUR DYESTUFFS.—A. Carpmal (I. G. Farbenindustrie.) 1222.
MANUFACTURE OF NITRO DYESTUFFS OF AZINE SERIES.—A. Carpmal (I. G. Farbenindustrie.) 1335.
MANUFACTURE OF SILICATES.—J. Crosfield and Sons, Ltd. (Philadelphia Quartz Co.). 1162.
MANUFACTURE OF BETAINE COMPOUNDS.—Deutsche Hydrierwerke A.-G. (Germany, Jan. 16, '37.) 1553.
PRODUCTION OF GAS-EXPANDED RUBBER SUBSTITUTES.—Expanded Rubber Co., Ltd. (United States, July 9, '37.) 1206.
ARTIFICIAL RESINS.—J. P. Fraser. 1456, 1457.
MANUFACTURE OF ISOCYCLIC COMPOUNDS.—W. W. Groves (I. G. Farbenindustrie.) (June 5, '36.) 1484, 1485.

PIGMENTS.—J. P. Fraser. 1458.
PRODUCTION OF FAST DYEINGS.—W. W. Groves (I. G. Farbenindustrie.) 1508.
MANUFACTURE OF CONDENSATION PRODUCTS.—W. W. Groves (I. G. Farbenindustrie.) 1634, 1638.
PROCESS FOR DYEING CELLULOSE ACETATE.—W. W. Groves (I. G. Farbenindustrie.) 1790.
MANUFACTURE OF CARBOXYLIC ACID NITRILES.—I. G. Farbenindustrie. (Germany, Jan. 20, '37.) 1491.
ACID-PROOF COATING ON ALUMINIUM METAL.—H. Hongo. 1499.
RECOVERY OF HYDROCARBONS.—I. G. Farbenindustrie. (Germany, Jan. 18, '37.) 1661.
PRODUCTION OF SHAPED ARTICLES FROM CELLULOSE ACETATE.—I. G. Farbenindustrie. (Germany, Jan. 19, '37.) 1772.
RECOVERY OF GASOLINE.—Houdry Process Corporation. (United States, Feb. 27, '37.) 1656.
MANUFACTURE OF POLYMERISATION PRODUCTS.—G. W. Johnson (I. G. Farbenindustrie.) 1347.
MANUFACTURE OF ANTHRAQUINONE DERIVATIVES.—G. W. Johnson (I. G. Farbenindustrie.) 1348.
TREATMENT OF CARBONACEOUS MATERIALS.—A. McCulloch. 1604.
MAGNESIUM ALLOYS.—Magnesium-Elektron, Ltd. (I. G. Farbenindustrie.) 1341.
MANUFACTURE OF DERIVATIVES OF PHENANTHRIDINE.—Sir G. T. Morgan, and L. P. Walls. 1123.
MANUFACTURE OF GLUCOSE, ETC.—Naamlooze Vennootschap Octrooien Maatschappij Activit. (Holland, Jan. 27, '37.) 1830.
MANUFACTURE OF STABLE PREPARATIONS.—Naamlooze Vennootschap Orgachemia. (Holland, Jan. 19, '37.) 1825; (Holland, Feb. 5, '37.) 1826.
FIRE-EXTINGUISHING LIQUID.—J. L. Seat. 1554.
ELECTROLYTIC PRODUCTION OF OXIDE-CONTAINING COATINGS on aluminium-free magnesium alloys.—Siemens and Halske, A.-G. (Germany, March 25, '37.) 1560.
APPARATUS FOR DISTILLATION OF TRICHLOROETHYLENE.—A. H. Tod. 1386.
LUBRICANTS.—Union Oil Co. of California. (United States, Jan. 18, '37.) 1556; (United States, Aug. 2, '37.) 1557; (United States, Nov. 2, '37.) 1558.
HARD METAL ALLOYS.—Vereinigte Edilstahl, A.-G. (Germany, Jan. 16, '37.) 1528.
PRODUCTION OF TANTALUM CARBIDE, ETC.—Vereinigte Edilstahl, A.-G. (Germany, Jan. 18, '37.) 1692.
PROCESS FOR OBTAINING SALTS OF SULPHANILAMIDE.—M. Woelm. (Germany, Jan. 26, '37.) 1610.

Specifications Open to Public Inspection

CHEMICAL MANUFACTURE.—Mathieson Alkali Works. July 13, 1936. 14886/37.
MANUFACTURE OF BUTADIENE.—Standard Oil Development Co. July 15, 1936. 16702/37.
PROCESS FOR OBTAINING BERYLLIUM FLUORIDE free from oxide. Seri Holding Soc. Anon. July 15, 1936. 17159/37.
POLYVINYL ACETAL RESIN COMPOSITIONS.—Carbide and Carbon Chemicals Corporation. July 16, 1936. 17561/37.
PRIMARY TRISAZO-DYESTUFFS OF RESORCINOL, their metal-compounds, and process for their manufacture.—J. R. Geigy, A.-G. July 13, 1936. 17943/37.
PROCESS FOR PREPARING LIQUID SATURATED HYDROCARBONS.—Naamlooze Vennootschap De Bataafsche Petroleum Maatschappij. July 16, 1936. 18354/37.
METHOD OF REMOVING IRON from naturally-occurring magnesium silicates.—Steatit-Magnesia, A.-G. July 14, 1936. 18356/37.
PROCESS FOR PRODUCING PLASTIC MASSES, foils, and threads and other structures from solutions of cellulose in sulphuric acid.—Wolff and Co. Komm.-Ges. Auf Aktien. July 14, 1936. 18811/37.
WORKING OF METAL.—Metal Carbides Corporation. July 15, 1936. 18905/37.
MANUFACTURE OF OXIDATION DYESTUFFS.—Soc. Anon. des Matieres Colorantes et Produits Chimiques de St.-Denis, and R. Lantz. July 15, 1936. 18998/37.
MANUFACTURE OF ORGANIC CARBOXYLIC ACIDS AND ESTERS.—E. I. Du Pont de Nemours and Co. July 14, 1936. 19320/37.
NON-CORROSIVE ALLOYS, and methods of their manufacture.—Alliages Autoprotectes. July 11, 1936. (Cognate Application, 19323/37.) 19322/37.

PROCESS FOR THE MANUFACTURE OF POLYHYDRIC ALCOHOLS of the cyclopentanopolymethylenanthrene series.—Schering-Kahlbaum, A.-G. July 14, 1936. 19427/37.

PROCESS FOR THE PRODUCTION OF NITROGEN-CONTAINING DYE-STUFF.—Montecatini, Soc. Generale per L'Industria, Mineraria, Ed Agricola. July 17, 1936. 19445/37.

MANUFACTURE OF INTERMEDIATE PRODUCTS and dyestuffs therefrom.—Soc. of Chemical Industry in Basle. July 14, 1936. 19520/37.

PRODUCTION OF PAINTS, coating-materials, and mouldable masses.—E. Nagelstein. July 14, 1936. 19572/37.

ADHESIVE COMPOSITIONS.—E. I. du Pont de Nemours and Co. July 15, 1936. 19681/37.

TREATMENT OF OILS.—F. Uhde. July 15, 1936. 19682/37.

PROCESS OF REFINING HYDROCARBON OILS.—Edeleanu Ges. July 16, 1936. 19745/37.

MANUFACTURE OF MONOVINYLAACETYLENE.—Dr. A. Wacker Ges., for Elektrochemische Industrie, Ges. July 17, 1936. 19746/37.

PROCESS AND APPARATUS FOR THERMAL DEPOSITION OF METALS or other materials.—P. Alexander. July 17, 1936. 19772/37.

Specifications Accepted with Date of Application

PRODUCTION OF ALKALINE EARTH carbonate layers.—Naamlooze Vennootschap Philips' Gloeilampenfabrieken. April 16, 1935. 478,187.

DYESTUFFS, and process of making same.—Gevaert Photo Producten N.V. June 6, 1935. (Samples furnished.) 477,990.

ALUMINIUM BASE ALLOYS.—British Aluminium Co., Ltd., and J. H. Dickinson. July 8, 1936. 478,125.

PRODUCING CAST IRON in a cupola furnace.—E. Privowsky. July 9, 1936. 478,198.

PROCESS FOR IMPROVING THE MACHINING QUALITIES OF IRON-NICKEL-ALUMINIUM ALLOYS.—R. Bosch, A.-G. July 22, 1935. 478,126; (September 9, 1935.) 478,127.

PROCESS FOR REMOVING SALTS from solutions.—Permutit, A.-G. July 27, 1935. 478,134.

CELLULOSE DERIVATIVE EMULSIONS.—E. I. du Pont de Nemours and Co. Aug. 15, 1935. 477,997.

MANUFACTURE OF KETENE, acetic anhydride or a homologue thereof.—H. Dreyfus, and L. Fellows. July 13, 1936. 478,303.

MANUFACTURE AND PRODUCTION OF AMINO COMPOUNDS.—G. W. Johnson (I. G. Farbenindustrie.) July 13, 1936. (Cognate Application, 30019/36.) 478,304.

RUBBER, RUBBER-LIKE SUBSTANCES, or artificial resins.—G. W. Johnson (I. G. Farbenindustrie.) July 13, 1936. 478,305.

ARTIFICIAL RESINS.—G. W. Johnson (I. G. Farbenindustrie.) July 13, 1936. 478,306.

PROCESS FOR THE MANUFACTURE OF DERIVATIVES OF SUBSTITUTED SUCCINIC ACIDS, and capillary active agents.—A. Carpmel (I. G. Farbenindustrie.) July 13, 1936. 478,308.

PRODUCTION OF POLYMERIC ESTERS of the acrylic acid series, E. I. du Pont de Nemours and Co., and A. J. Barrett. July 13, 1936. 478,309.

MANUFACTURE OF ORGANIC ACIDS AND ESTERS.—E. I. du Pont de Nemours and Co. July 13, 1935. 478,246.

TREATMENT OF CELLULOSE NITRATE.—E. I. du Pont de Nemours and Co. July 13, 1935. 478,212.

PROCESSES FOR THE MANUFACTURE OF BUTYL ALCOHOL from ethyl alcohols.—Deutsche Gold- und Silber-Scheideanstalt Vorm. Roessler. July 13, 1935. 478,141.

MANUFACTURE AND PRODUCTION OF OXIDATION PRODUCTS from paraffin hydrocarbons of high molecular weight.—G. W. Johnson (I. G. Farbenindustrie.) July 14, 1936. 478,317.

CONVERSION OF CARBON MONOXIDE with hydrogen into hydrocarbons or their oxygen-containing derivatives.—G. W. Johnson (I. G. Farbenindustrie.) July 14, 1936. 478,318.

PRODUCTION OF ALKALI CELLULOSE or other cellulose derivatives, for example, cellulose ethers.—E. I. du Pont de Nemours and Co., and F. C. Hahn. July 14, 1936. 478,255.

MANUFACTURE OF HALOGENATED PHTHALOCYANINES useful as pigments.—C. E. Dent, W. A. Silvester, and Imperial Chemical Industries, Ltd. July 14, 1936. 478,256.

MANUFACTURE OF CELLULOSE DERIVATIVES.—H. Dreyfus. July 16, 1936. (Cognate Application, 3205/37.) 478,259.

MANUFACTURE AND PRODUCTION OF OLEFINES.—G. W. Johnson (I. G. Farbenindustrie.) July 16, 1936. 478,003.

MANUFACTURE OF PIGMENTED COATING-COMPOSITIONS.—W. Charlton, R. Hill, E. E. Walker, R. B. Waters, and Imperial Chemical Industries, Ltd. July 16, 1936. 478,323.

MANUFACTURE OF KETENE, acetic anhydride, or a homologue thereof.—H. Dreyfus, July 17, 1936. 478,325, 478,326, 478,213.

PRODUCTION OF PLASTIC MASSES from organic colloids.—I. G. Farbenindustrie. July 17, 1935. 478,271.

ELECTROLYTIC PRODUCTION OF MAGNESIUM.—Magnesium Metal and Alloys, Ltd. July 20, 1935. 478,276.

MANUFACTURE AND PRODUCTION OF SYNTHETIC TANNING AGENTS.—G. W. Johnson (I. G. Farbenindustrie.) July 20, 1936. 478,280.

MANUFACTURE OF HYDROCHLORIC ACID and sodium sulphate.—A. Carpmel (I. G. Farbenindustrie.) July 21, 1936. 478,217.

MANUFACTURE AND PRODUCTION OF ISOPROPYL ACETATE.—G. W. Johnson (I. G. Farbenindustrie.) July 22, 1936. 478,073.

TREATMENT OF MATERIALS comprising organic esters of cellulose.—British Celanese, Ltd., H. Dreyfus, R. W. Moneriff, and F. B. Hill. April 8, 1936. 478,077.

MANUFACTURE OF CATALYSTS for organic synthesis.—E. I. du Pont de Nemours and Co. Oct. 26, 1935. 478,085.

MANUFACTURE OF DISAZO-DYESTUFFS.—J. K. Geigy, A.-G. May 8, 1936. 478,227.

PROCESS FOR THE MANUFACTURE OF DYESTUFFS for cellulose esters and products resulting therefrom.—Compagnie Nationale de Matieres Colorantes et Manufactures de Produits Chimiques du Nord Reunies Etablissements Kuhlmann. March 24, 1936. 478,228.

COATING GLASS SHEETS with polymerised vinyl compounds.—D. C. Polden, and E. W. Aldridge. March 31, 1937. 478,163.

Chemical and Allied Stocks and Shares

THE market for industrial shares has remained dull, and the tendency has been to lower prices in the absence of improvement in the volume of business. The disposition was for chief interest to centre on British Government stocks, and in response to the higher prices made by the latter there was a very firm trend in the better class debentures and preference shares of industrial companies. As far as concerns the ordinary shares of companies connected with the chemical and kindred trades the surrounding market trend proved the dominating influence, and lower prices have ruled as a result.

Imperial Chemical at 34s. 3d. have declined 6d., while Distillers are 2s. down at 103d., but it has to be remembered that the reduced prices now prevailing do not necessarily indicate less confident anticipations with regard to the dividend prospects of individual companies. Boots Drug, which last week rose from 47s. 7½d. to 48s. 6d., have reacted to 46s. 9d. at the time of writing, while British Oxygen are 80s. 7½d., compared with 82s. 6d.

The near approach of the dividend announcement induced more activity in Borax Consolidated deferred shares, which have risen from 27s. 3d. to 29s. 6d., although, as stated last week, there are conflicting views in the market as to whether an increase will be proposed. Lever Brothers ordinary did not keep best prices, but on balance show improvement from 37s. 6d. to 40s. In this case attention has been drawn in the market to the larger interim payment in November, and to the statement made when the fusion with Unilever was proposed that increased dividends for ordinary shareholders were likely to result. British Aluminium were also a good feature and have risen further from 46s. 3d. to 47s., while Murex at around 92s. 6d. have fully held their improvement of the previous week. In other directions, however, movements have been to lower levels.

Courtaulds at 46s. 3d. have declined moderately and were inclined to fluctuate pending next month's dividend announcement. Among iron, steel and allied securities there was a fairly steady tendency in Babcock and Wilcox at 43s. 3d., but lower prices ruled for Baldwins, Guest Keen, Consett Iron and Hadfields, although the market is also continuing to budget for larger dividends from these companies. United Steel moved down to 26s. 6d., but were steadier subsequently on the suggestion made in some quarters that the forthcoming interim payment may be increased moderately in order to bring it more into relation with the final dividend.

Pinchin Johnson at 36s. 9d. were slightly lower, despite the belief that the dividend is again likely to be brought up to 20 per cent. At the meeting last year it was stated that it was expected this rate would be maintained on the larger capital resulting from the bonus. Associated Portland Cement were slightly higher at 88s. 1½d. and Alpha Cement fairly steady at 38s., the disposition being to await the full terms of the proposed merger between the two companies, officially foreshadowed by the directors earlier in the year. It was then also stated that there were prospects that the Tunnel Cement Company might later also be concerned in this development. British Plaster Board at 25s. 9d. are lower on balance, and most other shares of companies associated with the building and allied industries were inclined to be easier.

Oil shares showed moderate improvement, although this was largely confined to "Shell," Anglo-Iranian and the other "leaders." Anglo-Ecuadorian and Lobites, however, made some recovery from their recent decline, while V.O.C. shares were fairly steady, following the announcement of the proposed increase in the capital by a bonus issue of shares.

New Companies Registered

Roussel Laboratories, Ltd. 336,062.—Private company. Capital, £2,000 in 2,000 shares of £1 each. To carry on business as manufacturers of and dealers in chemicals, gases, drugs, etc. Subscribers: Leslie Cork, 1 and 2 Finsbury Square, E.C.2.; Joseph L. Magnus, 1 and 2 Finsbury Square, E.C.2. Registered office: 1 and 2 Finsbury Square, E.C.2.

Northern Hygiene, Ltd. 335,134.—Private company. Capital £200 in 200 shares of £1 each. To carry on the business of manufacturers of and wholesale and retail dealers in chemicals, gases and disinfectants of all kinds, etc. Subscribers: John Skea, 2nd 20 Cheetham Hill Road, Stalybridge; Ann Ward. Registered office: 180/182 Corn Exchange Buildings, Fennel Street, Manchester, 4.

Shineall Products, Ltd. 335,403. Private company. Capital £300 in £1 shares. To carry on the business of wholesale and retail polish manufacturers and dealers, waterproofers, brush and pad makers, manufacturers of or dealers in cosmetics or any drugs, chemicals, etc. Subscribers: Alfred E. H. Blazey, 42 Queen Street, Neath; Thomas G. Evans.

Delaine Perfumery, Ltd. 334,891.—Private company. Capital £100 in 100 shares of £1 each. To carry on business as wholesale and retail dealers in pharmaceutical, medicinal, chemical, cosmetic, herbal, perfumery, toilet and beauty preparations, etc. Directors: Hunter E. Juniper, 156 Harland Avenue, Sidcup; Louis Winstone. Registered office: 9 New Square, Lincoln's Inn, W.C.2.

Ripley Webb, Ltd. 334,827.—Private company. Capital £100 in 100 shares of £1 each. To carry on the business of consulting, analytical, manufacturing, pharmaceutical and general chemists, etc. Directors: Herbert L. Pike, 13a Crowther Road, South Norwood, S.E.25; Yetta Lewis. Registered Office: 13a Crowther Road, S.E.25.

Vynne's Distilleries, Ltd. 335,785.—Private company. Capital, £1,000 in £1 shares. To carry out research work in connection with the preparation of foodstuffs of all kinds, vinegar and other liquids and chemical and other manures and to manufacture and sell the same, etc. Directors: Raymond G. Collier, Meadow House, Old Catton, Norwich; Fred. W. Palmer. Registered office: Swaffham, Norfolk.

Electro-Chemical Research Laboratories, Ltd. 334,941.—Private company. Capital £1,000 in 1,000 shares of £1 each. To carry on the business of proprietors of research laboratories, inventors, metallurgists, analysts, assayers, electricians, engineers, metal workers, founders, miners, smelters, chemists, druggists, etc. Directors: Fritz Eisner, 70 Ivor Court, Gloucester Place, N.W.1.; Henry T. M. Roberts. Registered office: Central House, Upper Woburn Place, W.C.1.

The Argus Industrial and Metal Trust, Ltd. 334,885.—Private company. Capital £5,000 in 10,000 shares of 10s. each. To adopt an agreement with Herbert Edwards, and to carry on the business of mercantile and general merchants, agents and brokers, importers and exporters of and dealers in ores, minerals and mineral and chemical substances, etc. Subscribers: Ronald J. Grimes, 22 Lodge Lane, Grays, Essex; Tom J. Parham. Registered office: 2 Broad Street Place, E.C.2.

Work and Science, Ltd. 335,680.—Private company. Capital £50,000 in £1 shares. To carry on the business as mechanical and general engineers, shipowners, metallurgists, and chemists, etc. Subscribers: Peter Dawson, 20 Empress Avenue, Ilford; John G. Hughes.

European Oil Trading Company, Ltd. 335,892.—Private company. Capital, £1,000 in 1,000 shares of £1 each. To carry on the business of distributors of and dealers in petrol, oil, bitumen, asphalt, all kinds of tar products, chemicals, metals, ores and mineral substances, etc. Subscribers: Henry J. Fellows, 13 Brampton Grove, Kenton, Middlesex; Frank J. Linnel.

Griffin and Tatlock (Laboratory Construction), Ltd. 335,658.—Private company. Capital £1,000 in £1 shares. To carry on the business of manufacturers of and dealers in furniture, equipment and plant for laboratory, scientific and educational purposes, etc. Directors: Major Alex. L. S. Wood, Spencer's Farm, Whelpley Hill, Chesham, Bucks; Norman M. Wood, Jas. D. Tatlock, John Kennedy.

British Flint and Cerium Manufacturers, Ltd. 336,072.—Private company. Capital, £2,000 in 2,000 ordinary shares of £1 each. To carry on the business of manufacturers, importers and exporters of and dealers in cerium metal, flints (pyrophoric), thorium chloride and extractions of rare earths, minerals, sand and monazite sands, etc. Directors: Joel Carman, 65 King Street, Ramsgate; Reuben Singer, Market Place, Ramsgate. Registered office: 120 High Street, Broadstairs, Kent.

Lonobarc Colour Works, Ltd. 335,640.—Private company. Capital £100 in £1 shares. To carry on the business of manufacturers, exporters and importers of and dealers in dry colours, waterpaste and oilpaste colours of all kinds, farina dextrines, gums, resins, and synthetic gums, paints, etc. Directors: Ernest A. Chandler, Charterhouse Chambers, Charterhouse Square, E.C.1; Olive A. Chandler. Registered Office: Charterhouse Chambers, Charterhouse Square, E.C.1.

Hardment Products, Ltd. 335,688.—Private company. Capital £500 in 5,000 shares of 2s. each. To carry on the business of manufacturers of and dealers and workers in paint, varnish, distemper, cement washes and compounds, waterproof dressings, colours, polishes, lacquers, enamels, chemicals, etc. Directors: Albert E. Dunnel, 66 Witley Court, Woburn Place, W.C.1.; Ronald W. Digns, William J. Barber, Edward J. Wilde. Registered Office: 113 Kingsway, W.C.2.

J. C. Thompson and Co. (Duron), Ltd. 335,772.—Private company. Capital, £2,000 in £1 shares (500 6 per cent. cumulative preference and 1,500 ordinary). To acquire the business of manufacturers of textile chemicals carried on by J. C. Thompson and J. E. Fea, of J. C. Thompson and Co., at Duron Works, Drummond Road, Bradford, and to acquire the goodwill of the business of manufacturers of Duron Paste and Duron Cream carried on by British Duron, Ltd., at 16 Brook Street, Ilkley, with the exclusive right to use the name "Duron" and the registered trade marks, Nos. 281,897, and 281,898. Directors: John C. Thompson, Belmont, Weston Lane, Otley, Yorks.; Jas. E. Fea.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

FERRAMIC INDUSTRIES, LTD., Welwyn Garden City, chemical manufacturers, etc. (M., 29/1/38.) January 13, mortgage to Midland Bank, Ltd., securing all moneys due or to become due to the Bank; charged on land and factory, etc., at Welwyn Garden City, etc. *Nil. July 27, 1937.

HAZLEWOOD AND SONS, LTD., Patricroft, chemical manufacturers. (M., 29/1/38.) January 14, debenture, to Mosley Street Nominees, Ltd., securing all moneys due or to become due to Williams Deacon's Bank, Ltd.; general charge. *Nil. February 15, 1933.

RILEY'S CHEMICALS AND COLOURS, LTD., Clayton-le-Moors. (M., 29/1/38.) January 12, charge, to District Bank, Ltd., securing all moneys due or to become due to the Bank; charged on property at Clayton-le-Moors. *Nil. October 22, 1936.

Satisfactions

HAZLEWOOD AND SONS, LTD., Patricroft, chemical manufacturers. (M.S., 29/1/38.) Satisfaction, January 14, of debenture registered September 9, 1931.

Books Received

Qualitative Inorganic Analysis. A. J. Berry. London: Cambridge University Press. Pp. 147. 6s.

The Chemistry of Synthetic Surface Coatings. By Dr. Wm. Krumbhaar. New York. Reinhold Publishing Corporation. Pp. 200. 20s.

Lubricating Greases: Their Manufacture and Use. By E. N. Klemgard. New York. Reinhold Publishing Corporation. Pp. 873. 75s.

Catalysis from the Standpoint of Chemical Kinetics. By Georg-Maria Schwab. London: Macmillan and Co., Ltd. Pp. 357. 18s.

Dictionary of Organic Compounds. Vol. III. Naphthacarbazole to Zygadenine. Edited by I. M. Heilbron and H. M. Bunbury. Pp. 943. London: Eyre and Spottiswoode. £6 6s.

Weekly Prices of British Chemical Products

THE demand for chemical products during the past week has not shown any marked expansion, but trade on the whole has been about the average for the period. Buyers for most of the important consuming industries have already placed their nearby requirements and to a certain extent this must have some bearing on the flow of spot business. There are no outstanding price changes to record for general chemicals, rubber chemicals and wood distillation products and quotations for most items continue steady. Sulphur is reported a little firmer. In the coal tar section pyridine continues to be good feature with quotations

dearer and firm. In other directions trade has been exceedingly slow and with buyers holding off prices are inclined to be a little easier, cresylic acid, naphthalene, and pitch all being a shade lower than recent levels. Nevertheless, a confident undertone prevails, it being generally felt that sooner or later the market must return to more active conditions.

GLASGOW.—There has been a rather better demand for chemicals for home trade during the week, though export inquiry still continues quiet. Prices remain very firm at about previous figures, with no important changes to report.

Price Changes

Rises: Bleaching Powder, 35/37%; Soda Caustic, solid, 76/77° E; Sodium Acetate (Scotland); Sodium Carbonate Monohydrate.

Falls: Carbolic Acid, dehydrated; Creosote, home trade; Cresylic Acid, 97/99%; 99/100%; Dark, 95%; American specification; Naphthalene, crude, whizzed, or hot pressed; Pitch, medium, soft; Wood Distillation Products.

General Chemicals

ACETONE.—£45 to £47 per ton.

ACETIC ACID.—Tech, 80%, £30 5s. per ton; pure 80%, £32 5s.; tech., 40%, £15 12s. 6d. to £18 12s. 6d.; tech., 60%, £23 10s. to £25 10s. MANCHESTER: 80%, commercial, £30 5s.; tech. glacial, £42 to £46.

ALUM.—Loose lump, £8 7s. 6d. per ton d/d; GLASGOW: Ground, £10 7s. 6d. per ton; lump, £9 17s. 6d.

ALUMINIUM SULPHATE.—£7 2s. 6d. per ton d/d Lanes. GLASGOW: £7 to £8 ex store.

AMMONIA, ANHYDROUS.—Spot, 1s. to 1s. 1d. per lb. d/d in cylinders. SCOTLAND: 10½d. to 1s. 0½d., containers extra and returnable.

AMMONIA, LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM CARBONATE.—£20 per ton d/d in 5 cwt. casks.

AMMONIUM CHLORIDE.—Grey galvanising, £19 per ton, ex wharf.

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Sal ammoniac.)

AMMONIUM DICHROMATE.—8½d. per lb. d/d U.K.

ANTIMONY OXIDE.—£68 per ton.

ARSENIC.—Continental material £11 per ton c.i.f., U.K. ports; Cornish White, £12 5s. to £12 10s. per ton f.o.r., mines, according to quantity. MANCHESTER: White powdered Cornish, £16 10s. per ton, ex store.

BARIUM CHLORIDE.—£11 10s. to £12 10s. per ton in casks ex store. GLASGOW: £11 10s. per ton.

BLEACHING POWDER.—Spot, 35/37%, £9 15s. per ton in casks, special terms for contracts. SCOTLAND: £9 per ton net ex store.

BORAX COMMERCIAL.—Granulated, £16 per ton; crystal, £17; powdered, £17 10s.; extra finely powdered, £18 10s., packed in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. GLASGOW: Granulated, £16, crystal, £17; powdered, £17 10s. per ton in 1-cwt. bags, carriage paid.

BORIC ACID.—Commercial granulated, £28 10s. per ton; crystal, £29 10s.; powdered, £30 10s.; extra finely powdered, £32 10s. in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. GLASGOW: Crystals, £29 10s.; powdered, £30 10s. 1-cwt. bags in 1-ton lots.

CALCIUM BISULPHITE.—£6 10s. per ton f.o.r. London.

CHARCOAL, LUMP.—£6 to £6 10s. per ton, ex wharf. Granulated, £7 to £9 per ton according to grade and locality.

CHROMETAN.—Crystals, 2½d. per lb.; liquor, £19 10s. per ton d/d station in drums. GLASGOW: 70/75% solid, £5 15s. per ton net ex store.

CHROMIC ACID.—9½d. per lb., less 2½%; d/d U.K.

CHROMIUM OXIDE.—11d. per lb.; d/d U.K.

CITRIC ACID.—1s. 0½d. per lb. MANCHESTER: 1s. 0½d. SCOTLAND: B.P. crystals, 1s. 0½d. per lb.; less 5%, ex store.

COPPER SULPHATE.—£21 7s. 6d. per ton, less 2% in casks. MANCHESTER: £19 per ton f.o.b. SCOTLAND: £19 15s. per ton, less 5%, Liverpool, in casks.

CREAM OF TARTAR.—100%, 92s. per cwt., less 2½%. GLASGOW: 99%, £4 12s. per cwt. in 5-cwt. casks.

FORMALDEHYDE.—£20-£22 per ton.

FORMIC ACID.—85%, in carboys, ton lots, £42 to £47 per ton. £4 17s. 6d. to £5 17s. 6d. per cwt. according to quantity; in drums, £4 10s. 6d. to £5 3s. 6d.

HYDROCHLORIC ACID.—Spot, 5s. 6d. to 8s. carboy d/d according to purity, strength and locality.

IODINE.—Resublimed B.P., 6s. 4d. per lb. in 7 lb. lots.

LACTIC ACID.—(Not less than ton lots) Dark, 50% by volume, £21 10s.; by weight, £27 10s.; Pale, 50% by volume, £27; by weight, £32 per ton. LANCASHIRE: Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £50; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £55; edible, 50%, by vol., £41. One-ton lots ex works, barrels free.

LEAD ACETATE.—LONDON: White, £31 10s. ton lots; brown, £35.

GLASGOW: White crystals, £31 10s.; brown, £1 per ton less. MANCHESTER: White, £33; brown, £32.

LEAD, NITRATE.—£32 per ton for 1-ton lots.

LEAD, RED.—£32 15s. 0d. 10 cwt. to 1 ton, less 2½% carriage paid. SCOTLAND: £32 per ton, less 2½% carriage paid for 2-ton lots.

LITHARGE.—SCOTLAND: Ground, £32 per ton, less 2½% carriage paid for 2-ton lots.

MAGNESITE.—SCOTLAND: Ground calcined, £9 per ton, ex store. MAGNESIUM CHLORIDE.—SCOTLAND: £7 10s. per ton.

MAGNESIUM SULPHATE.—Commercial, £5 10s. per ton, ex wharf.

MERCURY.—Ammoniated B.P. (white precip.), lump, 5s. 11d. per lb.; powder B.P., 6s. 1d.; bichloride B.P. (corros. sub.) 5s. 2d.; powder B.P. 4s. 10d.; chloride B.P. (calomel), 5s. 11d.; red oxide cryst. (red precip.), 7s.; levig. 6s. 6d.; yellow oxide B.P. 6s. 4d.; persulphate white B.P.C., 6s. 1d.; sulphide black (hyd. sulph. cum sulph. 50%), 6s. For quantities under 112 lb., 1d. extra; under 28 lb., 5d. extra.

METHYLATED SPIRIT.—61 O.P. industrial, 1s. 5d. to 2s. per gal.; pyridinised industrial, 1s. 7d. to 2s. 2d.; mineralised, 2s. 6d. to 3s. Spirit 64 O.P. is 1d. more in all cases and the range of prices is according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

NITRIC ACID.—Spot, £17 to £30 per ton according to strength and destination.

OXALIC ACID.—£48 15s. to £57 10s. per ton, according to packages and position. GLASGOW: £2 9s. per cwt. in casks. MANCHESTER: £49 to £54 per ton ex store.

PARAFFIN WAX.—SCOTLAND: 3½d. per lb.

POTASH CAUSTIC.—Solid, £35 5s. to £36 15s. per ton for 2-ton lots ex store; broken, £42 per ton. MANCHESTER: £39.

POTASSIUM CHLORATE.—£36 7s. 6d. per ton. GLASGOW: 4½d. per lb. MANCHESTER: £37 10s. per ton.

POTASSIUM DICHROMATE.—5½d. per lb. carriage paid. SCOTLAND: 5½d. per lb., net, carriage paid.

POTASSIUM IODIDE.—B.P. 5s. 6d. per lb. in 7 lb. lots.

POTASSIUM NITRATE.—Small granular crystals, £24 to £27 per ton ex store, according to quantity. GLASGOW: Refined granulated, £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 9½d. per lb. SCOTLAND: B.P. Crystals, 9½d. MANCHESTER: B.P. 10½d. to 1s.

POTASSIUM PRUSSIAN.—6½d. per lb. SCOTLAND: 7d. net, in casks, ex store. MANCHESTER: Yellow, 6½d.

SALAMMONIAC.—Firsts lump, spot, £42 17s. 6d. per ton, d/d address in barrels. Dogtooth crystals, £36 per ton; fine white crystals, £18 per ton, in casks, ex store. GLASGOW: Large crystals, in casks, £37 10s.

SALT CAKE.—Unground, spot, £3 10s. 6d. per ton.

SODA ASH.—58% spot, £5 17s. 6d. per ton f.o.r. in bags.

SODA, CAUSTIC.—Solid, 76/77° spot, £14 per ton d/d station. SCOTLAND: Powdered 98/99%, £18 10s. in drums, £19 5s. in casks, Solid 76/77° £15 12s. 6d. in drums; 70/73%, £15 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts, 10s. per ton less.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—£19-£20 per ton carriage paid North. GLASGOW: £18 10s. per ton net ex store.

SODIUM BICARBONATE.—Refined spot, £10 15s. per ton d/d station in bags. GLASGOW: £13 5s. per ton in 1 cwt. kegs, £11 5s. per ton in 2-cwt. bags. MANCHESTER: £10 10s.

SODIUM BISULPHITE POWDER.—60/62%, £20 per ton d/d 1 cwt. iron drums for home trade.

SODIUM CARBONATE MONOHYDRATE.—£20 per ton d/d in minimum ton lots in 2 cwt. free bags.

SODIUM CHLORATE.—£27 10s. to £32 per ton. GLASGOW: £1 11s. per cwt., minimum 3 cwt. lots.

SODIUM CHROMATE.—4½d. per lb. d/d U.K.
SODIUM DICHROMATE.—Crystals cake and powder 4½d. per lb. net d/d U.K. with rebates for contracts. MANCHESTER: 4d. per lb. GLASGOW: 4½d. net, carriage paid.
SODIUM HYPOSULPHITE.—Pea crystals, £14 10s. per ton for 2-ton lots; commercial, £11 5s. per ton. MANCHESTER: Commercial, £11; photographic, £15 10s.
SODIUM METASILICATE.—£14 5s. per ton, d/d U.K. in cwt. bags.
SODIUM NITRATE.—Refined, £8 per ton for 6-ton lots d/d. GLASGOW: £1 12s. 0d. per cwt. in 1-cwt. kegs, net, ex store.
SODIUM NITRITE.—£18 5s. per ton for ton lots.
SODIUM PERBORATE.—10%, 9½d. per lb. d/d in 1-cwt. drums.
SODIUM PHOSPHATE.—Di-sodium, £12 per ton delivered for ton lots. Tri-sodium, £15 to £16 per ton delivered per ton lots.
SODIUM PRUSSIAN.—d. per lb. for ton lots. GLASGOW: 5d. to 5½d. ex store. MANCHESTER: 4½d. to 5d.
SODIUM SILICATE.—£9 10s. per ton.
SODIUM SULPHATE (GLAUBER SALTS).—£3 per ton d/d.
SODIUM SULPHATE (SALT CAKE).—Unground spot, £3 to £3 10s. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 12s. 6d.
SODIUM SULPHIDE.—Solid 60/62%, Spot, £11 15s. per ton d/d in drums; crystals, 30/32%, £9 per ton d/d in casks. MANCHESTER: Concentrated solid, 60/62%, £11; commercial, £8 10s.
SODIUM SULPHITE.—Pea crystals, spot, £14 10s. per ton d/d station in kegs.
SULPHUR PRECIP.—B.P., £55 to £60 per ton according to quantity. Commercial, £50 to £55.
SULPHURIC ACID.—168° Tw., £4 11s. to £5 1s. per ton; 140° Tw., arsenic-free, £3 to £3 10s.; 140° Tw., arsenious, £2 10s.
TARTARIC ACID.—1s. 1½d. per lb. less 5%, carriage paid for lots of 5 cwt. and upwards. MANCHESTER: 1s. 1½d. per lb. GLASGOW: 1s. 1d. per lb., 5%, ex store.
WHITE SUGAR OF LEAD.—£31 10s. per ton net.
ZINC SULPHATE.—Tech., £11 10s. f.o.r., in 2 cwt. bags.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 7d. to 1s. 2d. per lb., according to quality. Crimson, 1s. 6d. to 1s. 7½d. per lb.
ARSENIC SULPHIDE.—Yellow, 1s. 5d. to 1s. 7d. per lb.
BARYTES.—£6 to £6 10s. per ton, according to quality.
CADMIUM SULPHIDE.—7s. to 7s. 3d. per lb.
CARBON BLACK.—4½d. per lb., ex store.
CARBON DISULPHIDE.—£31 to £33 per ton, according to quantity, drums extra.
CARBON TETRACHLORIDE.—£41 to £46 per ton, according to quantity, drums extra.
CHROMIUM OXIDE.—Green, 10½d. to 11d. per lb.
DIPHENYLGUANIDINE.—2s. 2d. per lb.
INDIA-RUBBER SUBSTITUTES.—White, 4½d. to 5½d. per lb.; dark 4d. to 4½d. per lb.
LAMP BLACK.—£24 to £26 per ton del., according to quantity. Vegetable black, £35 per ton upwards.
LEAD HYPOSULPHITE.—9d. per lb.
LITHOPONE.—30%, £16 10s. to £17 5s. per ton.
SULPHUR.—£9 to £9 5s. per ton. SULPHUR PRECIP. B.P., £55 to £60 per ton. SULPHUR PRECIP. COMM., £50 to £55 per ton.
SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quantity.
VERMILION.—Pale, or deep, 5s. per lb., 1-cwt. lots.
ZINC SULPHIDE.—£58 to £60 per ton in casks ex store, smaller quantities up to 1s. per lb.

Nitrogen Fertilisers

AMMONIUM SULPHATE.—The following prices have been announced for neutral quality basis 20.6% nitrogen, in 6-ton lots delivered farmer's nearest station up to June 30, 1938: November, £7 8s.; December, £7 9s. 6d.; January, 1938, £7 11s.; February, £7 12s. 6d.; March/June, £7 14s.
CALCIUM CYANAMIDE.—The following prices are for delivery in 5-ton lots, carriage paid to any railway station in Great Britain up to June 30, 1938: November, £7 10s.; December, £7 11s. 3d.; January, 1938, £7 12s. 6d.; February, £7 13s. 9d.; March, £7 15s.; April/June, £7 16s. 3d.
NITRO CHALK.—£7 10s. 6d. per ton up to June 30, 1938.
SODIUM NITRATE.—£8 per ton for delivery up to June 30, 1938.
CONCENTRATED COMPLETE FERTILISERS.—£11 4s. to £11 13s. per ton in 6-ton lots to farmer's nearest station.
AMMONIUM PHOSPHATE FERTILISERS.—£10 19s. 6d. to £14 16s. 6d. per ton in 6-ton lots to farmer's nearest station.

Coal Tar Products

BENZOL.—At works, crude, 9½d. to 10d. per gal.; standard motor, 1s. 3d. to 1s. 3½d.; 90%, 1s. 4d. to 1s. 4½d.; pure, 1s. 8d. to 1s. 8½d. GLASGOW: Crude, 10d. to 10½d. per gal.; motor, 1s. 4d. to 1s. 4½d.

CARBOLIC ACID.—Crystals, 7½d. to 8½d. per lb., small quantities would be dearer; Crude, 60's, 3s. 9d. to 4s.; dehydrated, 4s. 4½d. to 4s. 7½d. per gal. MANCHESTER: Crystals, 9d. per lb. f.o.b. in drums; crude, 4s. per gal. GLASGOW: Crude, 60's, 4s. 3d. to 4s. 6d. per gal.; distilled, 60's.

CREOSOTE.—Home trade, 6½d. to 6½d. per gal., f.o.r. makers' works; exports, 6½d. to 6½d. per gal., according to grade. MANCHESTER: 5½d. to 6½d. GLASGOW: B.S.I. Specification, 6d. to 6½d. per gal.; washed oil, 5d. to 5½d.; lower sp. gr. oils, 5½d. to 6½d.

CRESYLIC ACID.—97/99%, 3s. 7½d. to 3s. 10½d.; 99/100%, 4s. to 5s. 6d. per gal., according to specification; Pale, 99/100%, 4s. to 4s. 3d.; Dark, 95%, 3s. 4½d. to 3s. 7½d. per gal. GLASGOW: Pale, 99/100%, 5s. to 5s. 6d. per gal.; pale, 97/99%, 4s. 6d. to 4s. 10d., dark, 97/99%, 4s. 3d. to 4s. 6d.; high boiling acids, 2s. to 2s. 6d. American specification, 3s. 9d. to 4s. MANCHESTER: Pale, 99/100%, 4s.

NAPHTHA.—Solvent, 90/160, 1s. 6½d. to 1s. 7½d. per gal.; solvent, 95/160%, 1s. 7d. to 1s. 8d., naked at works; heavy 90/190%, 1s. 1½d. to 1s. 3d. per gal., naked at works, according to quantity. GLASGOW: Crude, 6½d. to 7½d. per gal.; 90%, 160, 1s. 5d. to 1s. 6d., 90%, 190, 1s. 1d. to 1s. 3d.

NAPHTHALENE.—Crude, whizzed or hot pressed, £7 to 8s. per ton; purified crystals, £16 per ton in 2-cwt. bags. LONDON: Fire lighter quality, £5 10s. to £7 per ton. GLASGOW: Fire lighter, crude, £6 to £7 per ton (bags free). MANCHESTER: Refined, £17 per ton f.o.b.

PITCH.—Medium, soft, 35s. to 37s. per ton, f.o.b. MANCHESTER: 33s. f.o.b., East Coast. GLASGOW: f.o.b. Glasgow, 35s. to 37s. per ton; in bulk for home trade, 35s.

PYRIDINE.—90/140%, 13s. 6d. to 15s. per gal.; 90/160%, 11s. to 13s. 6d. per gal.; 90/180%, 3s. 3d. to 3s. 9d. per gal. f.o.b. GLASGOW: 90% 140, 10s. to 12s. per gal.; 90% 160, 9s. to 10s.; 90% 180, 2s. 6d. to 3s. MANCHESTER: 12s. 6d. to 14s. per gal.

TOLUOL.—90%, 1s. 10½d. to 1s. 11½d. per gal.; pure, 2s. 3½d. to 2s. 4½d. GLASGOW: 90%, 120, 1s. 10d. to 2s. 1d. per gal.

XYLOL.—Commercial, 2s. 2d. per gal.; pure, 2s. 4d. GLASGOW: Commercial, 2s. to 2s. 1d. per gal.

Wood Distillation Products

CALCIUM ACETATE.—Brown, £7 10s. to £8 per ton; grey, £9 10s. to £10. Liquor, brown, 30° Tw., 6d. to 8d. per gal. MANCHESTER: Brown, £9 10s.; grey, £11 10s.

METHYL ACETONE.—40.50%, £35 to £40 per ton.

WOOD CREOSOTE.—Unrefined, 4d. to 8d. per gal., according to boiling range.

WOOD NAPHTHA, MISCIBLE.—3s. 3d. to 3s. 6d. per gal.; solvent, 3s. 6d. to 3s. 9d. per gal.

WOOD TAR.—£2 to £8 per ton, according to quality.

Intermediates and Dyes

ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.

ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.

BENZIDINE, HCl.—2s. 7½d. per lb., 100% as base, in casks.

BENZOIC ACID, 1914 B.P. (ex toluol).—1s. 11d. per lb. d/d buyer's works.

m-CRESOL 98/100%.—1s. 8d. to 1s. 9d. per lb. in ton lots.

o-CRESOL 30/31° C.—6½d. to 7½d. per lb. in 1-ton lots.

p-CRESOL, 34.5° C.—1s. 7d. to 1s. 8d. per lb. in ton lots.

DICHLORANILINE.—2s. 1½d. to 2s. 5½d. per lb.

DIMETHYLANILINE.—Spot, 1s. 7½d. per lb., package extra.

DINITROBENZENE.—8½d. per lb.

DINITROCHLOROBENZENE, SOLID.—£79 5s. per ton.

DINITROTOLUENE.—48/50° C., 9½d. per lb.; 66/68° C., 11d.

DIPHENYLAMINE.—Spot, 2s. 2d. per lb., d/d buyer's works.

GAMMA ACID.—Spot, 4s. 4½d. per lb. 100% d/d buyer's works.

H ACID.—Spot, 2s. 7d. per lb.; 100% d/d buyer's works.

NAPHTHIONIC ACID.—1s. 10d. per lb.

β-NAPHTHOL.—£97 per ton; flake, £94 8s. per ton.

α-NAPHTHYLAMINE.—Lumps, 1s. 1d. per lb.

β-NAPHTHYLAMINE.—Spot, 3s. per lb.; d/d buyer's works.

NEVILLE AND WINTER'S ACID.—Spot, 3s. 3½d. per lb. 100%.

o-NITRANILINE.—4s. 3½d. per lb.

m-NITRANILINE.—Spot, 2s. 10d. per lb. d/d buyer's works.

p-NITRANILINE.—Spot, 1s. 10d. to 2s. 3½d. per lb. d/d buyer's works.

NITROBENZENE.—Spot, 4½d. to 5d. per lb., in 90-gal. drums, drums extra. 1-ton lots d/d buyer's works.

NITRONAPHTHALENE.—10½d. per lb.; P.G., 1s. 0½d. per lb.

SODIUM NAPHTHIONATE.—Spot, 1s. 11d. per lb.; 100% d/d buyer's works.

SULPHANILIC ACID.—Spot, 8½d. per lb. 100%, d/d buyer's works.

o-TOLUIDINE.—11½d. per lb., in 8/10-cwt. drums, drums extra.

p-TOLUIDINE.—2s. per lb., in casks.

m-XYLIDINE ACETATE.—4s. 8d. per lb., 100%.

Forthcoming Events

London.

- January 31.**—University College, Gower Street, W.C.1. 5 p.m. Dr. H. R. Ing, "Chemical Structure and Pharmacological Action."
February 2.—Society of Public Analysts. Joint Meeting with the Food Group of the Society of Chemical Industry.
February 3.—The Chemical Society. Burlington House, Piccadilly, W.1. 5 p.m. Discussion on "Associated Liquids," to be opened by J. D. Bernal.
February 4.—The Institute of the Plastic Industry. Seventh Annual Dinner and Dance, Café Royal, Regent Street, W.1. 7 p.m.
February 7.—Society of Chemical Industry. Burlington House, Piccadilly, W.1. 8 p.m. Professor T. Dillon, "The Seaweed Industry and the Possibilities of its Revival."
 University College, Gower Street, W.C.1. 5 p.m. Dr. H. R. Ing, "Chemical Structure and Pharmacological Action."
February 8.—The Institute of the Plastics Industry. British Industries House, Marble Arch, W.1. 7.30 p.m. G. E. Scharff, "Synthetic Rubber."
February 9.—Royal Society of Arts. John Street, Adelphi, W.C.2. 8.15 p.m. John Roberts, "The Search for Oil."

Aberdeen.

- February 4.**—The Chemical Society. Marischal College. 5.15 p.m. Joint Meeting with the Institute of Chemistry. Professor John Read, "Alchemy in Scotland."

Birmingham.

- February 1.**—Electrodepositors' Technical Society. James Watt Memorial Institute, Great Charles Street. 7.30 p.m. R. Vogt, "Plating on Aluminium and Light Alloys."
February 7.—The Chemical Society. University Edgbaston. 5 p.m. Joint Meeting with the Birmingham University Chemical Society. Professor W. E. Garner, "The Thermal Decomposition of Solids."

Glasgow.

- February 4.**—Society of Chemical Industry. Royal Technical College, 204 George Street. 7.30 p.m. Joint Meeting with Food Group. Professor J. C. Drummond and Dr. Cuthbertson, "Nutrition."

Hull.

- February 1.**—Hull Chemical and Engineering Society. Hull Photographic Society's Room, Grey Street, Park Street. 7.45 p.m. S. J. Gregg, "The Structure of Atoms and Molecules."

Manchester.

- February 8.**—The Chemical Society. University. 7 p.m. Joint Meeting with the Manchester Section of the Institute of Chemistry and the Manchester University Chemical Society. Professor E. C. Dodds, "The Significance of Synthetic Oestrogenic Agents."

Newcastle.

- February 4.**—The Bedson Club. King's College, Newcastle-upon-Tyne. 6.30 p.m. J. Kenner, "Aliphatic Diazo Compounds."

Swansea.

- February 4.**—The Chemical Society. University College. 6 p.m. Joint Meeting with the University College of Swansea Chemical Society. Dr. E. G. Cox, "Structural Crystallography and Chemistry."

Company News

Genatosan, Ltd., controlled by Anglo-Continental Guano Works, announces an interim of 10 per cent. (15 per cent.).

Benzol and By-Products, Ltd., in their report for the year ended September 30, 1937, shows net profits £24,614 (£4,902); deduct from debit balance brought forward £129,483, leaving debit forward of £104,869.

L. Rose and Co., Ltd., manufacturers of lime juice cordial, etc., has declared a dividend on the preferred ordinary shares for six months ending January 31, at rate of 8 per cent. per annum, less tax 4s. 7.93d.

Redfern's Rubber Works, Ltd., announces that final dividends are to be paid on February 15 in respect of 1937 as follows:—3½ per cent. on A and B preference shares, making 7½ per cent. for the year; 12½ per cent. on ordinary shares, making 17½ per cent. (same) for the year.

The Stanton Ironworks Co. proposes to increase its capital from £2,500,000 to £3,000,000 by the creation of 70,000 6 per cent. cumulative preference shares and 430,000 ordinary shares, all of £1. The whole of the new preference and 30,010 of the new ordinary shares are being created with a view to the acquisition of the issued share capital of the Wellingborough Iron Co., which Stanton Ironworks already controls through its subsidiary Stonedale Investments. Further, 17,206 of the 37,644 unissued 6 per cent. preference shares are to be converted into ordinary shares, and the articles of association are to be amended.

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